

THE IRON AGE

April 23, 1931



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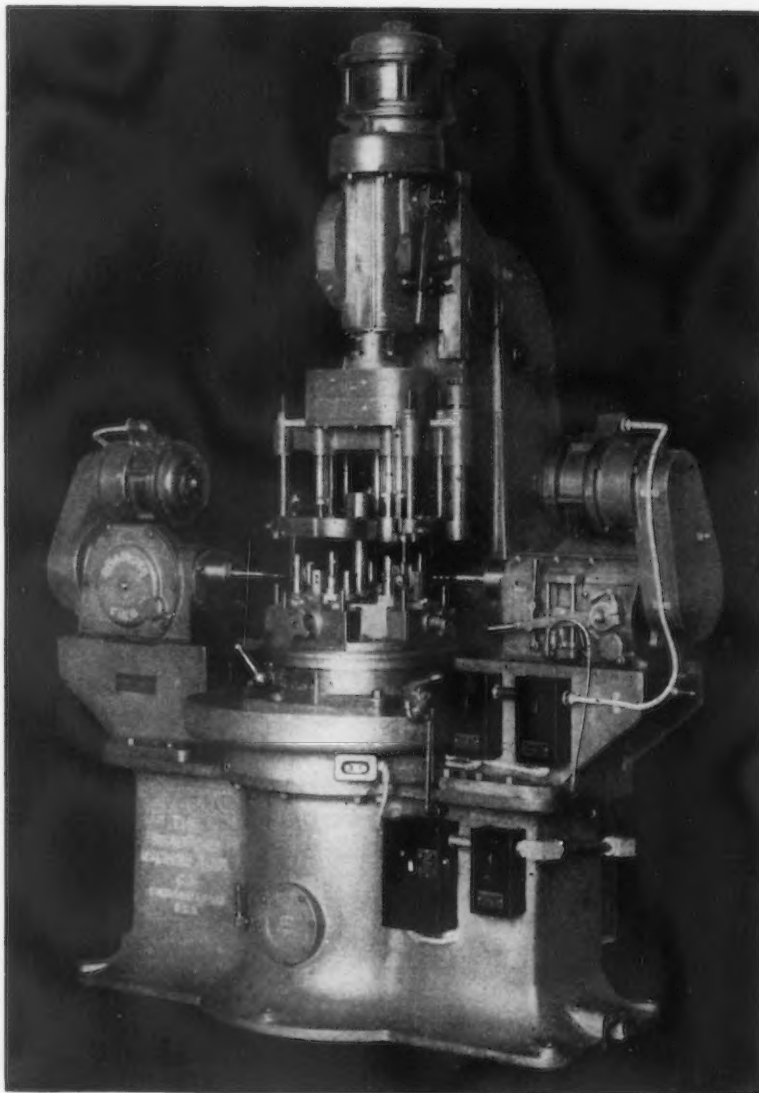
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THE BANKERS AND EQUIPMENT REPLACEMENTS

ARE bankers averse to loaning money for the purchase of cost-saving equipment? Some manufacturers think so. We determined to find out the financier's attitude toward the replacement of obsolete equipment under present-day conditions. On pages 1363-6 of this issue of The Iron Age, our readers will find the results of our survey of this subject. It indicates a wide acceptance, in banking circles, of the desirability of keeping production equipment up to date. But it shows that the maker and the user of this equipment must take certain steps before expecting the money man to produce the funds.





NOTHING ROLLS
LIKE A BALL

It was no problem to motorize this machine



Nor is it a problem to motorize any machine where New Departure Ball Bearings are an inbuilt motor feature. Vertical mountings are just as feasible with these bearings as all others because New Departures have generous thrust capacity. The same rules of economy apply to all New Departure motor installations . . . once-a-year lubrication . . . proof against wear and rotor drop. This machine is a product of the Bradford Machine Tool Company, of Cincinnati. Many New Departures are used in its construction. It drills a number of holes in a small pump part with accuracy and stabbing swiftness. New Departures are a great aid to continuous and rapid production. They are sturdy. The New Departure Mfg. Co., Bristol, Conn.; Detroit, Chicago, San Francisco.

NEW DEPARTURE BALL BEARINGS

THIS ISSUE IN BRIEF

APRIL 23, 1931

NEXT WEEK

NO branch of the metal-working industry has been more alive to the advantages of cost-saving methods and equipment than the foundry industry. Yet with all the mechanical aids that have been devised the making of molds and the pouring of castings remain, in the final analysis, an art. It is really to be marveled at that in an industry in which so much depends upon skill technical advancement has been so rapid and the competition of other industries has been so successfully met. Castings not even dreamed of a decade ago are now being made on a production basis. The manufacture of huge locomotive foundation castings, 60 ft. long and weighing 65 to 70 tons, will be outlined in a feature article next week.

Bitter Competition Leads to Monopoly and Reduced Quality

Severe competition inevitably tends to lower the grade of the product even more than it lowers its price. Such competition, carried to extreme, inevitably brings about the extinction of the weaker competitors and finally creates a monopoly.—Page 1332.

Falling Prices Stimulate Industrial Ingenuity, but Lower Ethics

The high incentive to economies tends to make the great industries more and more efficient, but, says economist, increasingly bitter competition is apt to bring in its train a lower standard of commercial ethics.—Page 1330.

Avoiding Permanent "Lay-offs" in Dull Times

A New England manufacturer keeps his force of efficient workers intact by dividing among seven workers, for example, the jobs in a group of eight, and having each in rotation take a week off without pay.—Page 1333.

Mold-Pourer "Rides" with Flasks

Flasks are placed on small trucks running in oval track. Ladle is suspended from monorail. Operator, on platform moving at same speed as flasks, hooks the ladle to the flask and pours.—Page 1335.

Sheet Steel Enamels Harmed by Sulphur Dioxide

Tests reveal that nitrogen, carbon dioxide and reducing atmospheres are not deleterious to the enamels during the smelting process, but sulphur dioxide is markedly so.—Page 1354.

Prevents Corrosion in Pressure Vessels

Newly perfected alloy sheet steel lining bonds with the vessel wall, developing a shear strength of 8000 to 15,000 lb. in the bond. Corrosionless, the wall thickness remains constant, reducing the possibility of explosion, obviating the need for reduction of operating pressures to compensate for corrosion, and permitting the use of a thinner initial wall.—Page 1356.

For Best Results in Liquid Carburizing

Do not use a temperature higher than 1550 deg. F. with sodium cyanide. Tests reveal that depth of case and its carbon content are less when steel is treated at 1600 deg. F.—Page 1339.

How to Get a Deep Case in Liquid Hardening

Aerocase compound No. 510, with addition of activating material No. 28 produces a case depth of 0.032 in. in 3 hr., with carburizing temperatures of 1650 to 1700 deg. F.—Page 1339.

Rail Mill Can Work a Bar in Each Stand Simultaneously

Transferring from roughing to intermediate and from intermediate to finishing stands is all done by traveling tables on entering side.—Page 1343.

Sees Great Possibilities in "Dispersion" Hardening

"It is not going too far to expect to be able to 'dispersion' harden any metal or alloy, no matter how weak or soft, if we find the alloy combination with the right set of chemical or physical characteristics," says metallurgist.—Page 1349.

How to Calculate Roll Concavity

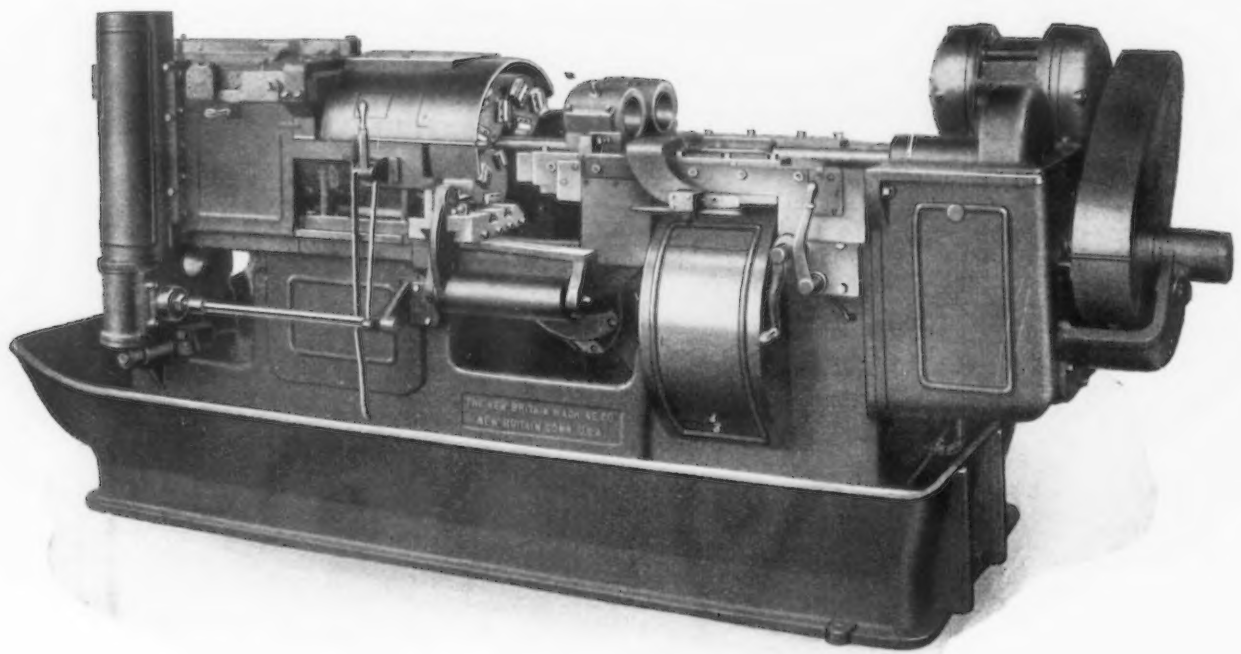
Rolls for hot-rolling sheets must be concaved to allow for extra heat expansion in the middle of the roll. A correct formula for figuring concavity in a pair of rolls with a known "cross" is given on Page 1353.

"Moral Chameleons" May Soon Appear

Large intermediate class, whose honesty is not permanent but opportunist, falls from grace in boom times and in times of stress. It may soon be with us and create a period marked by low levels of practice.—Page 1330.

Sales Fluctuate but Production Is Economically Level

Manufacturing costs in ammunition plant have dropped markedly by reason of planned production. Total production is estimated at beginning of year, and revised each quarter.—Page 1350.



New Britain New-Matic Chucking Machines

We invite you to investigate New Britain New-Matics as a means of lowering your production costs. These Multiple Spindle, Work Rotating, Automatic Chucking Machines, with air or hydraulic control, have repeatedly solved this vital problem for others.

New-Matics are built in four sizes, No. 454 (illustrated), Four Spindles—8" chucks; No. 654, Six Spindles — 5 $\frac{5}{8}$ " chucks; No. 452, Four Spindles — 6" chucks; No. 652, Six Spindles—4 $\frac{3}{8}$ " chucks.

Complete descriptive matter is available.

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NEW BRITAIN, CONN.
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THE IRON AGE

ESTABLISHED 1855

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WHAT HAPPENS DURING LONG-TERM PRICE DECLINES?

By EDWIN C. ECKEL

FROM 1874 to 1896 commodity prices and interest rates fell, practically without interruption and in every country in the world. It is this fact which gives point to the history of the period, and all of the social and political developments that took place during these two decades were colored by it.

In every country certain large classes were benefited by the decline; in every country certain other large classes were injured by it, and, in every country, politicians explained that the damage to these last was due to the policies of some opposition party. In every country reformers explained that what was needed was some new political nostrum, in every country the chief remedy offered was some sort of cheap currency—inflation by means of paper money or free silver or land notes. This was not a new situation; all the world had gone through similar follies during the long price decline from 1819 to 1842; it is practically certain that all of the world will go through the very same experiences during any price decline that may occur in the future.

We are not interested in theoretical price movements, but in their actual social ef-

fects, which are always translated into political dogma and action.

Now the effects of a long period of steadily falling prices are these; prices begin to fall, and at first everyone except the immediate producer is happy, because income or wages will purchase more.

Almost immediately, however, the country becomes divided in sentiment into two camps. On the one hand, everyone who derives a fixed income from rent, securities, or a permanent salary, continues to rejoice as prices fall. But on the other hand everyone whose income depends on selling products, and everyone who owes money on mortgages or otherwise, finds that life is becoming more difficult. So far, the tendency of falling prices is to increase the gulf between those who have and those who only hoped to have.

These effects, which are obvious results of falling prices, tend to press with most severity upon the farmer, because the interest on his mortgage is a fixed quantity while the prices of his products fall with those of other commodities. Each period of falling prices, therefore, is a period of political unrest in our farming



Survival of the industrial fittest is a result of the sifting action of long-term price declines.



Political housecleaning accompanies the pressure of declined prices for efficiency in government as well as in industry and distribution.

States and commodities. We can go farther and say that it is equally a period of political unrest among the farmers of Great Britain, France and Australia, because like causes are acting there as well as here.

Meantime the equally important class which labors in factory, mine, mill and transport fares better, because though in a long continued decline wages may also fall, they do not fall so promptly or so far as do commodity prices. Throughout a period of price decline, the tendency is toward an increase in the actual purchasing power of the wage, even though its money quotation may be slightly reduced.

The purely industrial effects of falling prices are, in general, good for the community. There is a high incentive to economies that has been lacking during the preceding boom period; there is a reason to invent new and more economical processes or methods of manufacture and to adopt such improvements promptly when they are invented. The great industries tend to become more and more ingenious, more and more efficient, as prices fall. From a purely moral standpoint the gain is less clear, for increasingly bitter competition is apt to bring in its train a lower standard of commercial ethics.

Finally, the parasitic classes tend to become of even less relative importance. If the depression continues long enough, some members of these classes may even be driven into productive work of one sort or another.

The period of 1873-1896 gave us lessons in all of the

SUPPOSE, as many economists predict, a term period of declining prices, wages, output and profits?

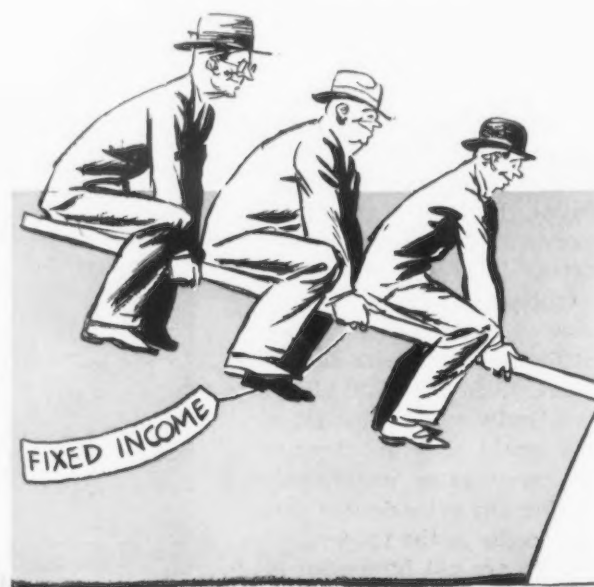
We can expect under such conditions, a recurrence of at least the long-term price decline of 1873

Executives will do well to consider experience, and to aid them in so doing, publish, in advance, some extracts from of American industrial history.

directions which it will pay to recall now, since we seem to be facing a similar period of price decline. The one which attracted greatest public interest, and which is still given widest publicity in historical works, relates to the process of political corruption and to its final correction.

Honesty is with most people a matter of course. With a relatively small class, on the other hand, dishonesty is equally a matter of course. There still remains a large intermediate class whose honesty is not permanent but opportunist. With this class honesty is a matter of balance between their own necessities at the moment, the amount of temptation, the chance of detection and the seriousness of the probable punishment. Many men, for example, who could be safely left in the same room alone with a watch could not be trusted in the same country with an oil reserve. And there are other men who, if at the moment they were temporarily rich, would scorn to rob the country of even an oil field but who, reduced to poverty, would readily take the watch.

It is the existence of this class of moral chameleons that gives rise to the phenomena that we are now



Price variation actuates an economic seesaw

ict, that we are to experience a long-
What is likely to happen to industry,

tions, in the opinion of the author of
some of the results brought about by
to 1896.

future possibilities in the light of past
Mr. Eckel has made it possible for us to
a forthcoming book on economic phases

studying—the appearance in the same country of
periods broadly marked by high commercial and polit-
ical morality, followed by periods equally marked by
low levels of practice. The evil effects are most likely
to appear at two separate stages of our economic
cycles. In the progress of a great boom the tempta-
tion offered can be made higher; while toward the end
of a long depression the necessities are greater. A
period of slow regular progress, on the other hand,
does not afford the same inducements either to the
great briberies of the boom period or to the petty
trade and political dishonesty of the crisis.

Inflation and Deflation of Currency

One of the very prompt reactions against the con-
tinuous fall of prices took place in the direction of at-
tempting to stop the fall by some government measure
of currency inflation. This is an entirely normal re-
action and we may expect to see it appear in one
form or another in the years to come, just as it did
in the two or three decades after the Civil War.

The expedients offered between 1866 and 1896
covered a wide range of possible action, ranging from



that brings joy to some and grief to others.



Under the stern pressure of necessity, invention, discovery and im-
provement proceed at an accelerated rate.

frank dishonesty to mere delusion. The first and
perhaps the most dishonest proposition was that the
government should redeem its bonds not in gold but in
paper currency. This was finally negated, which
marked a decided advance in public morality since
the days of the Fathers, for we must recall that
after the Revolution repudiation had been accepted
without much argument, except for the foreign debt.

At later stages came the effort, successful for a
time, to retain all the paper in service, until the de-
mands of the country could grow up to the currency
supply. The resumption of specie payments, effected
in 1879, put an end to these phases of the matter.

In still later years there were national party plat-
forms and campaigns which turned on the proposi-
tion of issuing a new supply of paper or of returning
to the free coinage of silver, which had been demon-
etized in 1873 by a large number of countries in addi-
tion to the United States.

From 1896 on to the peak of high prices in 1919-
1921, no one was interested in a cheap money issue;
but from now on the question is bound to regain its
political importance, and unless some new factor en-
ters to change the situation we may fairly prophesy
that within a few years we will again face arguments
in favor of issuing paper, or coining silver, or stamp-
ing clay into currency.

The Growth of Commodity Output

During this whole period of slowly falling prices
there was a steady growth in the output of our lead-
ing commodities, both natural and manufactured prod-
ucts. This is presented sufficiently for our present
purposes in the table on page 1333.

We note at the first glance that in all cases output
of these essential commodities increased very largely
during the twenty-year period in question; it is only

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when the figures are examined more closely that certain disquieting features come to light. These relate to the disproportion between agricultural and other growth during the period and can be considered best later on when the economic fortunes of the farmer are discussed. At present we will confine our attention to the rate of development of the manufacturing industries and of their necessary raw materials.

At the outset it may be said that for almost all industries the five years between 1873 and 1878 or 1879 were years not merely of falling prices but of falling or at best stationary output; it was a period of frank commercial depression, following a great financial crisis; and it was experienced all over the world, and by all industrial countries in about the same intensity.

During this period of cruelly forced economy most industries worked on short time, and created commodities in hand-to-mouth fashion. The result was that gradually industrial and financial soundness was restored, and a period of active growth arrived again. It will be noted that both coal and iron outputs showed no gain in the period 1873 to 1878; but that both were doubled in the equal period 1878 to 1883. But here again another though lesser crisis came to stop the progress, for by 1884 the financial situation had again become unsound, and with the usual reaction upon the greater industries. After a relatively short period of depression all industries began to grow at a high rate, which culminated early in 1893.

The net result for the twenty-year period is that the coal output of the country, which is a fair index to its activity in both industry and transport, tripled between 1873 and 1893; and that the iron output gained in only slightly lower ratio. Copper, cement and petroleum showed increases of much more striking character, due in each case to specially favorable conditions—the growth of the electrical industry and

Connellsville coke	\$ 1.00 per ton	1894
Foundry iron, Birmingham	\$ 5.75 per ton	1897
Bessemer pig, Pittsburgh	\$ 9.50 per ton	1897, May
Structural shapes, Pittsburgh	0.98c. per lb.	1897, Aug.
Steel rails, Pittsburgh	\$15.00 per ton	1897
Steel billets, Pittsburgh	\$14.00 per ton	1897, July
Pig lead, New York	2.60c. per lb.	1896, Aug.
Lake copper, New York	8.94c. per lb.	1894, June
Spelter (zinc), New York	3.10c. per lb.	1895
Spot cotton, New York	5 1/8c.	1894
Spot cotton, New York	5 3/16c.	1897
Cash wheat, Chicago	48 1/4 c. per bu.	1895
Cash corn, Chicago	19c. per bu.	1896
Crude oil, Pennsylvania	50c. per bbl.	1892, Oct.
Crude oil, Pennsylvania	65c. per bbl.	1897, Oct.
Portland cement, average U.S.	\$1.57 per bbl.	1896
Portland cement, average U.S.	\$0.813 per bbl.	1909

of the telegraph and newly invented telephone systems, the discovery of new oil fields, the beginnings of modern steel-and-concrete construction in the cities and elsewhere.

The manufacturing industries as a whole seem to have somewhat more than doubled during this twenty-year period of declining prices, regard being paid both to labor employed and to the total value of the output.

During the whole period under consideration there was essentially no upward reaction, but a very marked and very resistless fall in prices of all commodities. To a small extent, but to only a small extent, this was due to the resumption of specie payments in the United States. But this influence was ended by 1879, and thereafter American prices moved downward in accordance with general conditions in world trade.

The Trend of Business Organization

As we have seen the period between 1873 and 1896—indeed, between 1864 and 1896—was a period in which all important commodities were produced in increasing quantities each year, and in which most of them were sold at lower prices each year. These two facts, taken together, suggest immediately that the period must have been one of bitter competition in most industries; and that was indeed the fact. Theoretical economists had always extolled the advantages of competition, and all of the current textbooks on political economy spoke, and speak even today, as if competition were itself an unmixed blessing. In real life, of course, the case is different. We all know that in reality severe competition in any industry or occupation inevitably tends to lower the grade of the product, even more than it lowers its price; and that such competition carried to its logical textbook extreme just as inevitably brings about the extinction of the weaker competitors and the final creation of a monopoly.

Wages and Labor Conditions

A period that was marked by falling prices, increased output and bitter business competition was, perhaps necessarily, also a period of marked labor unrest and of great development in labor organization. So between 1873 and 1896 we find numerous times when unemployment became a serious problem, other periods when strikes took place in numbers and on scales hitherto not experienced. And along with these, partly as consequences and partly as causes, we find also a vast growth in the organization of the in-

PRICE TRENDS OF IMPORTANT COMMODITIES OVER
THE PERIOD 1873-1894

	Pig Iron, Per Ton, Phila.	Bar Iron, Per Ton, Phila.	Steel Rails, Per Ton	Coal, Anthracite Average at Mines	Oil Penn. Crude	Wheat, Average Farm Value	Cotton, Upland Cents Per Lb.	Wool, Medium, Eastern Markets, Cents Per Lb.
1873	\$42.75	\$86.43	\$120.50		\$1.83	\$1.15	18.2	53
1874	30.25	67.95	94.25		1.17	0.94	17.0	54
1875	25.50	60.85	68.75		1.35	1.00	15.0	50
1876	22.25	52.08	59.25		2.56	1.04	13.0	40
1877	18.88	45.55	45.50		2.42	1.08	11.7	44
1878	17.63	44.24	42.25		1.19	0.78	11.3	37
1879	21.50	51.85	48.25		0.86	1.11	10.8	43
1880	28.50	60.38	67.50	\$1.47	0.94	0.95	12.0	48
1881	25.12	58.05	61.13	2.01	0.91	1.19	11.3	46
1882	25.75	61.41	48.50	2.01	0.79	0.88	12.2	45
1883	22.38	50.30	37.75	2.01	1.09	0.91	10.6	40
1884	19.88	44.05	30.75	1.79	0.83	0.64	10.6	34
1885	18.00	40.32	28.50	2.00	0.86	0.77	10.5	35
1886	18.71	43.12	34.50	1.95	0.70	0.69	9.4	38
1887	20.92	49.37	37.08	2.01	0.71	0.68	10.3	36
1888	18.88	44.99	29.83	1.91	0.88	0.67	10.3	34
1889	17.75	43.40	29.25	1.44	0.94	0.68	10.7	37
1890	18.40	45.92	31.75	1.43	0.87		11.5	37
1891	17.52	42.56	30.00	1.46	0.67		8.6	35
1892	15.75	41.89	30.00	1.57	0.56		7.3	33
1893	14.52	38.08	28.00	1.59	0.64		8.4	24
1894	12.66	30.02	24.00	1.51	0.84		7.5	21

dividual trades, the beginnings of national trades federations; and the first real traces of a class consciousness, leading toward the formation of distinct socialist groups and parties. The trades union movement and the socialist movement were distinctly separate in their beginnings, leadership and results, though there was of course a certain similarity in the causes that brought both about.

Agrarian Difficulties

Throughout the entire period now under review there was almost continuous agitation, particularly in the West and Northwest, among farmers, based upon grievances which it was claimed should be remedied by political action or otherwise. It is true that these grievances were not always expressed clearly or ably; and at times, when they were presented by professional politicians, there was necessarily a touch of insincerity. It is possible also that some of the remedies suggested were foolish, and that others were inadequate. But, these facts admitted, I think that a careful study of the data available suggests that there were actual and very serious difficulties in the farmer's situation throughout the two decades in question.

The matter is of more than historic interest, because it seems certain enough that some of the conditions which gave rise to agrarian discontent during the period 1873-1896 are conditions which will certainly reappear during the period of slowly falling prices that is now ahead of us—if indeed they have not already reappeared.

In 1870 each manufacturing wage earner had produced *six* times as much value of product as the farmer; in 1890 the factory hand produced *eight* times

GROWTH OF OUTPUT OF VARIOUS BASIC COMMODITIES, 1873-1893

Commodity	1873	1878	1883	1888	1893
Wheat, million bushels	281	420	421	416	396
Wool, million pounds	158	208	290	269	303
Cotton, million bales	4.2	5.1	5.7	6.9	7.5
Coal, million tons	51	52	103	133	163
Pig iron, million tons	2.6	2.3	4.6	6.5	7.1
Copper, thousand tons	15.5	21.5	51.6	101.0	147.0
Petroleum, million bbls.	9.9	15.4	23.4	27.6	48.4
Cement, million bbls.	1.8	2.2	4.1	6.5	8.0

as much. In whatever way these figures be considered, there seems to be clear proof that the farmer's position, bad enough in 1870, had become both absolutely and relatively worse during the two decades that followed.

The period 1873-1896 had been one of falling prices; and both farm products as well as manufactured products were about one-third lower in 1893 than in 1873. But the manufacturer had been able to meet this by securing a higher tonnage per wage earner employed; while the farmer had not been able to get a higher number of bushels per acre tilled.

Lowest Prices of History

The business depression continued for some years after the panic of 1893 and prices of commodities fell almost steadily until 1896 or thereabout. In the tabulation on page 1332 extreme low prices and dates are given for a number of the most important American commodities. In every case except petroleum and cement the extreme low point in all recorded history was reached during the period 1894-1897.

Taking Care of Labor When Business Is Slack

MANY a concern has been faced with the necessity for shortening its labor commitments without disrupting its organization. Some companies have made drastic reductions on something like a percentage basis, without regard to future conditions. Others—the more far-seeing ones—have laid their plans ahead and have retained as many of their key men and good workers as it has been possible to keep on the payroll.

Something of the method employed by a New England manufacturer may be suggestive to executives of other companies. This organization has followed two or three different methods for taking care of this problem, but each one has been thought out as best suited to the particular case at hand.

In the first place there was the positive method of going after more business than was available from the usual fatalistic or stand-pat attitude of so many business concerns. An addition was made to the sales force and the list of prospects was combed more diligently than ever before.

Notwithstanding the results of this forward-looking policy, it became apparent some time ago that the payroll would have to be cut. First, the entire list was gone over and every bit of deadwood, so to speak, was eliminated. This did not suffice.

Then each department was scanned with relation to the possibility of working somewhat shorter hours than the full-time week prevailing. This resulted in either shutting down the department on Saturday mornings (since the plant does not work Saturday afternoons), or of relieving half of the force in a given department on the first and third Saturday mornings of the month, while the other half were not working on other Saturdays.

In a few instances, where several people were on similar work, it was possible so to divide the jobs that one person out of eight, say, would take a week off at his own expense every eight weeks. Thus the seven persons remaining in the group would carry on, week in and week out, but the personnel would change to the extent of one of the eight taking a week off as soon as the preceding member returned.

It is never a pleasant task to have to lay off workers or to shorten their employment and consequently their pay envelopes. Every one of those who is working less steadily than before is made to realize the predicament in which the company finds itself through no fault of its own. Hence the hard feelings which might be expected to go with curtailed employment have no place here, and the morale of the employees is maintained.



Operator pouring from moving platform into flasks moving at the same rate. He pulls along the ladle as required.

MOVING POUR

By J. B. NEALEY
American Gas Association,
New York

SYNCHRONIZED speeds for a mold conveyor, a pouring platform alongside and the ladle carriage on monorail overhead are employed in easing the job of filling the molds in a Birmingham plant. This is a foundry making a great variety of castings for pipe fittings of all kinds, and in which gray iron, malleable and steel castings all are produced.

POURING castings "on the run," as it were, with the flasks moving down the line on a traveling conveyor while the operators pour the molten metal, is established practice in a number of foundries. A recent innovation, however, is a motor-operated platform running parallel to the flask conveyor and a ladle trolley parallel to both. As the empty flasks and full ladles travel along together, on their respective conveyors, the operators ride along on the moving platform and pour the molten metal from one to the other with ease and accuracy, for the rate of travel of all three is nicely synchronized.

Such an installation has been made at the plant of the Stockham Pipe & Fittings Co., Birmingham, Ala. This plant is divided into three main divisions—gray iron, malleable and steel castings—and here are made all kinds of fittings, including standard and extra heavy, oil and heavy oil, hydraulic, etc., screwed and flanged; also all kinds of sprinkler fittings, etc.

Running along one side of the main building, the raw material yard is served with a railroad spur and a craneway 78 ft. wide and 875 ft. long. The cupolas

are arranged in a single row parallel to this yard, and just inside the building. Raw material storage is provided for in the space between the tracks and building. Sand and coke are handled with grab buckets and iron and scrap with magnets. The coke is dropped into pits and elevator conveyors lift it up into storage bins over the cupolas.

Two Cupolas Furnish Iron for Malleable Castings

ONE of the most interesting sections of this plant is the malleable iron division, which is served by two cupolas located at about the center of one side of the building. Directly in front of these cupolas is an overhead rail in the form of a loop, from which ladles are suspended. These are on trucks riding on the rail, so that they can be pulled along with ease. On the other side of this unit is a loop-shaped track, laid out on the floor, with a traveling chain in the center pulling dollies or cars, riding on the tracks, along with it. Flasks made up by operators located along the further side of this track loop are placed directly on the cars.

ING PLATFORM FEATURES

SOUTHERN CASTINGS PLANT

When these flasks and cars have made the turn they are then traveling parallel to and directly under the ladle runway. Alongside and parallel with both is the moving platform. The operator simply fills his ladle at the cupola, pulls it around to the platform (on to which he steps), hooks it to the flask so that it will follow through without further effort on his part and pours the metal. At the end of the "run" he steps off the platform, pulls his ladle around to the cupola again and repeats the cycle.

Core-making units are arranged along the further wall of the building and the pattern storage racks are in a line parallel. The shakeout is at one end of the track loop and fans and hoods here remove all smoke, dust and dirt, while the sand falls through a grating to a traveling belt conveyor which collects it for re-conditioning. Transferred to another conveyor, the castings are taken to the cleaning room tumblers; after tumbling they are sent to the annealing room.

Cores are baked in a row of four gas-fired ovens. These are double-compartment ovens constructed of insulated steel panels and provided with swing doors. Each is 7 ft. wide, 12 ft. long, and 6 $\frac{3}{4}$ ft. high, and is heated with two pipe-burners with lava tips, set one on each side, close to the floor. Ventilation is supplied through one long pipe with take-off flues to each oven, a single motor-operated fan supplying the draft. Larger cores are baked in a similar but larger oven, 20 ft. long, 15 ft. wide and 7 ft. high.

Insulated Furnaces for Heat Treating

Many furnaces of several different types are used for malleableizing. Most of these units are served with overhead monorail systems and pneumatic hoists as an aid in handling the castings and boxes. These furnaces are of heavy brick construction, insulated and suitably stayed, and are fired with gas. One such unit, 30 ft. long, 15 ft. wide and 10 ft. high, is heated with 20 gas burners on each side, half of which are located in the upper portion of the wall and half in the lower, so as to provide even distribution of heat.

The castings are packed in alloy steel boxes 2 x 3 ft. x 1 $\frac{1}{2}$ ft. deep, and the filled boxes are charged into the furnace, one above the other, and then sealed with fireclay. Gas is supplied at high pressure. By the use of automatic gas-air proportioners, of the venturi type, any desired atmosphere can be obtained and maintained in the furnace. Four thermocouples are distributed at strategic points in the furnace and charts of the temperature fluctuations of each are kept on a single recording pyrometer. Most of these furnaces are ventilated with natural draft flues, which take off near the bottom.

A car-bottom type furnace, near the one described, has a pit for the car to operate in, just deep enough so that the car top, which forms the hearth of the furnace, is level with the concrete floor of the room. This furnace, 15 ft. long, 10 ft. wide and 6 $\frac{1}{2}$ ft. high, is heated with 12 gas burners to a side, half high up and half low down on the furnace walls. A monorail with hand hoists is used in loading and unloading and the car top is provided with a sand seal so that the



Steel castings being charged into car-bottom type annealing furnace.

heat of the furnace will not penetrate below to the trucks. A recording pyrometer maintains two charts of the temperatures in two parts of this furnace and it requires about 3 hr. to bring the whole from room temperature up to approximately 1800 deg. F.

A large volume of castings is malleableized in a row of five furnaces, two of which are each 20 ft. long, 15 ft. wide and 10 ft. high. These are heated with 14 gas burners to the side, firing from above and below, and two temperature lines are kept on a recorder. The other three furnaces are each 14 ft. long, 9 ft. wide and 6 ft. high, and are heated with 18 gas burners on each side. An overhead monorail with hoists is part of the equipment.

Heat Treatment for Castings of Steel

STEEL castings receive a special treatment here that requires two furnaces, one for the high heat and the other for controlling the cooling or grain growth period. These are of the car-bottom type, open at one end only, and are placed so that the doors face each other with a 15-ft. space between. A track runs between and into these furnaces and another, of the same length and parallel, lies just outside.

A pit at right angles to these tracks, between the ovens, is equipped with a transfer truck and track. When this truck and track are centered between the ovens the furnace car can be run from one oven to the other or can be located on the truck and transferred to the outside track, according to the heat treatment scheduled. The cars are pulled in and out with a winch and the work is handled with a swing post crane and hoist.

These furnaces are of brick, 12 ft. long, 8 ft. wide and 10 ft. high, and each is fired with 12 gas burners on each side. The castings are piled loose on the cars. Most of the work treated in these furnaces is of

two classes, carbon steel and nichrome steel. Both are heated to 1550 or 1600 deg. F. in the first furnace.

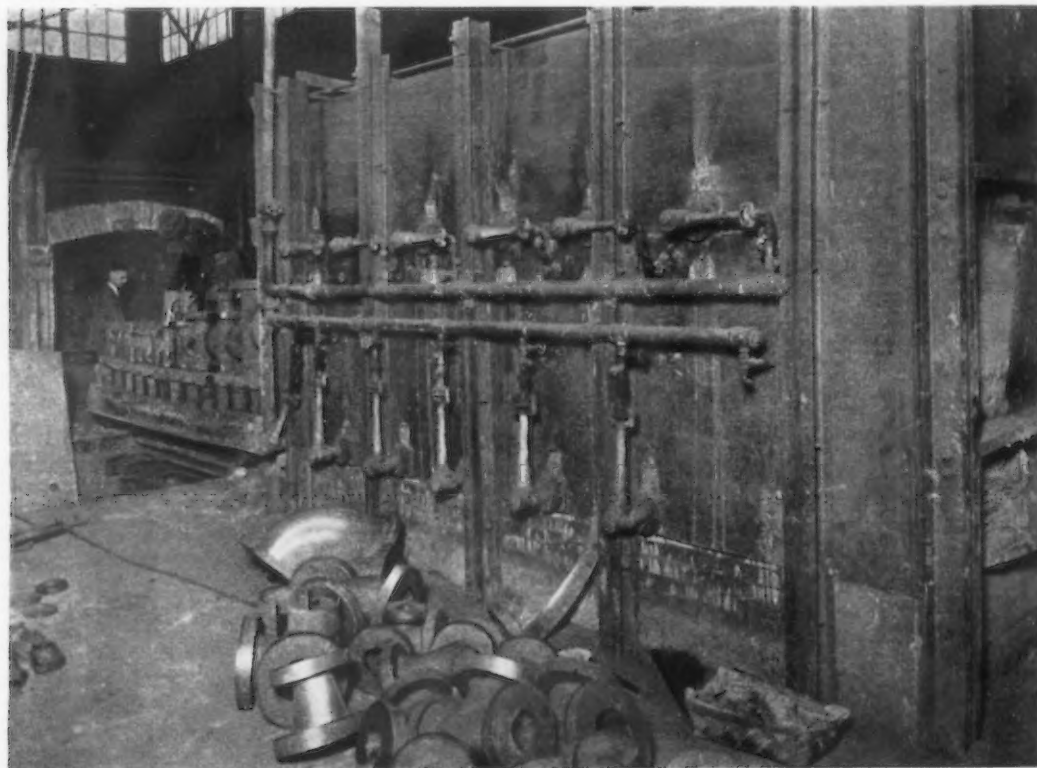
Nichrome steel castings, pulled out of the furnace and left in the air until cooled to blackness, are then transferred to the other furnace, which is already heated to about 1300 deg. F., and then allowed to cool slowly. The carbon steel castings, on the other hand, are pulled from the high-temperature furnace and put directly into the other furnace, which is cold. This furnace is then sealed and the work allowed to cool slowly.

Another unit group of two furnaces is used for similar work. These treatments of malleableizing and annealing are very exacting and require close control, both as to temperature cycle and furnace atmosphere.

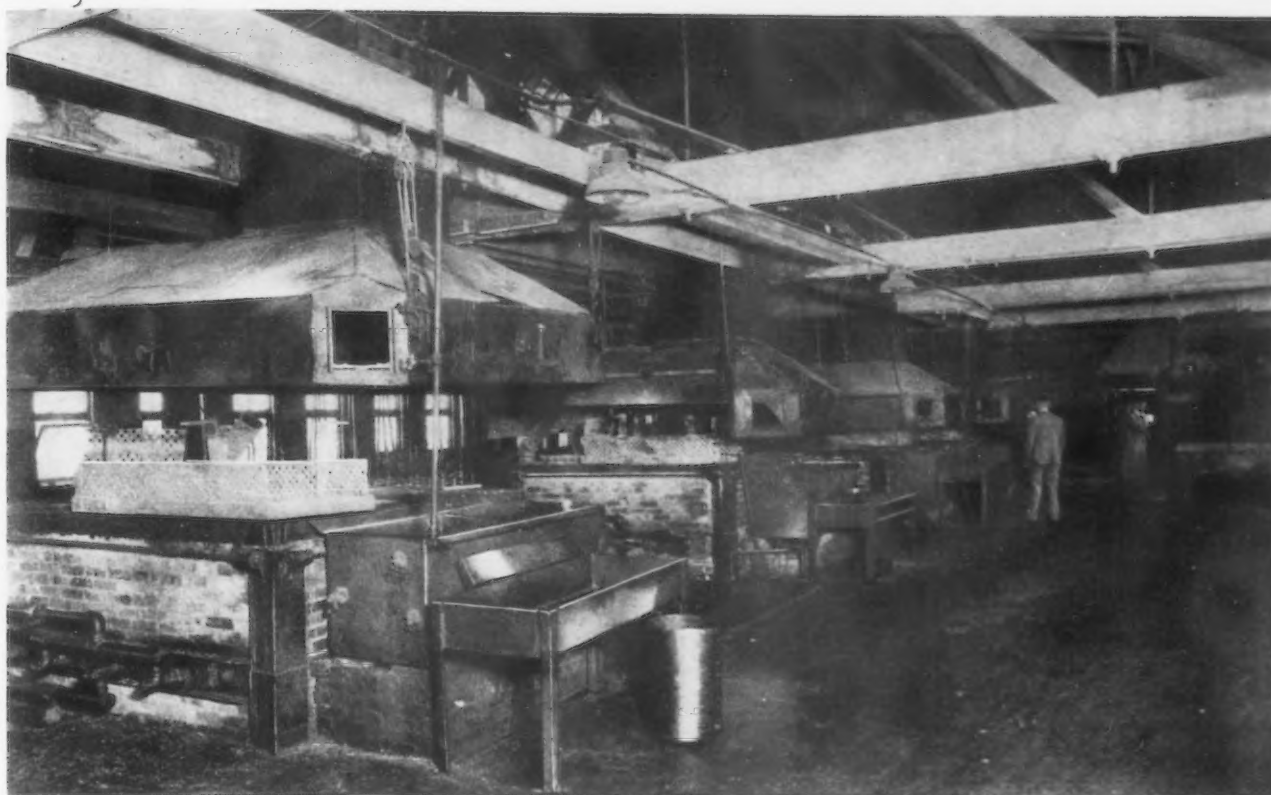
Galvanizing Castings

Malleableized castings are finally pickled, dried and galvanized in several units each consisting of a row of pickle vats, dryers and galvanizing furnaces and kettles, all served with an overhead monorail loop conveyor. The castings are hung on hooks suspended from trucks on the conveyor, and are pushed along by the operators. The conveyor extends past all of these and there are four galvanizing kettles to a unit. After dipping the castings in the pickle they are placed on the dryers, one in back of each kettle. A dryer consists of a steel plate which is kept hot with the waste heat from the kettle.

Each kettle furnace is of brick, 10 ft. long, 8 ft. wide and 3½ ft. high. It is hooded and is heated with four gas burners on each side, these burners being of the impact type, and provided with gas-air proportioners. The dry castings are placed on racks, dipped into the molten zinc, quenched in oil and then placed in tote boxes for further handling. The accumulation of dross on these hand racks is burned off in a sheet



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Tandem heat-treating furnaces for castings, in which the car (seen between furnaces, at left) is passed successively from the high-temperature unit to the cooling unit and then out.
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Gas-fired galvanizing kettles for coating pipe fittings with zinc.

steel, brick-lined furnace, about 3 ft. in each dimension, and heated with two high-pressure, tunnel-type gas burners.

All fitting are tested with both cold and hot water, the latter supplied by a 50-hp. steam boiler fired with gas, the burners being sealed into the fire-door openings. The water is heated in two U-tube heaters, each consisting of steam coils within a tank, the heat from the steam being imparted to the water. This boiler is equipped with an automatic steam pressure control,

consisting of a diaphragm governor connected by pipe to the steam header on one side and by piston with a shutoff valve in the gas supply line on the other side.

When the pressure rises above the point set on the regulator, it causes the diaphragm to sink and close off the gas flow, thus reducing the volume of flames and heat under the boiler, which in turn causes the steam pressure to drop. When the pressure has gone below the setting the diaphragm rises, the valve opens and so on.

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Hardening Heads of Rails by Water Quenching

EFFECT of hardening with water the running surface of steel rails is discussed in a recent article in *Stahl und Eisen* by O. Pilz and H. Meyer, and some interesting results were obtained.

The writers proceeded on the theory that, among rails with high wear resistance, those in which the running surface is not too highly hardened, ought to give specially good results owing to their great toughness and resistance to fracture. Even in them, however, transverse surface cracks caused by the grinding action of the tires may occur. While such transverse cracks may lead to breakages, experience so far does not indicate that they are of any great importance. So-called "kidney-shaped fractures" (*taches ovales*), which may appear in very hard rails as a result of internal stresses, have not hitherto been observed in hardened basic-Bessemer steel rails. The manner in which such fractures arise and the magnitude of the cooling strains in rails were studied and reported upon.

To determine whether there are any objections to an increased hardening of the running surface on grounds of safety, rails with different degrees of surface hardening from two different works were subjected to comparative tests. These embraced the chemical analysis, structure and physical properties of the samples. Owing to the defects in strength revealed by the tests as a result of the dissimilar hardness in the samples, special tests were also carried out on the uninjured rail section. No fundamental objections against extreme hardening of the running surface were found.

In the wearing test the highest surface hardening corresponded to the greatest resistance to wear. The rails in question, therefore, should presumably also prove most durable in service. Practical tests of such rails in service have given favorable results, and it may be expected that these tests will remove the prejudice in some quarters against such rails.

BEHAVIOR OF LIQUID CARBURIZING BATHS

By E. C. MOFFETT

Technologist,
American Cyanamid Co.
New York

CASE hardening is not a modern art, although it has become of great commercial importance since the advent of the bicycle and the motor car. Potassium cyanide was probably the first material used extensively in the molten condition as a liquid bath. This form of cyanide was a commercial product before sodium cyanide was available. It is still used but in a relatively small amount. The literature contains very little information about the results produced by potassium cyanide, but we are of the opinion that the hardness and the rate of penetration are about the same as are obtained with sodium cyanide. We have heard old hardeners claim that the fume was less irritating.

Cyanide of Sodium Used for Many Years

Sodium cyanide has been used almost exclusively for a number of years, possibly as far back as 1900. The high-grade material containing 96 to 98 per cent NaCN was used first, and later mixtures containing some salt and sodium carbonate. A question frequently asked is, what is the rate of deterioration of sodium cyanide? Several investigators have published the result of their experiments covering this point. Hillman and Clark have prepared a paper showing graphically the results obtained. Baths of "96 to 98" grade and "43" grade were operated for 42 hr. at 1500 deg. F. under normal production requirements. A series of analyses of the baths was made over the period at three-hour intervals, and curves were plotted from the results.

Three runs were made using each grade of sodium cyanide. The higher analysis material showed a uniform deterioration, the curve representing it being almost a straight line, for 10 hr. The average rate of deterioration for the three runs during this period was about 5 per cent per hour, while for the next 10 hr. the average was 2 per cent per hour.

It has been found that a cyanide concentration of about 30 per cent is necessary to give good penetration and hard-

ness on low-carbon steel. Using the curves as a guide we find that, at 30 per cent concentration, the average rate of deterioration is between 2 and 3 per cent per hour. This rate also holds for the 43 grade materials and therefore it is necessary to add every hour 2 to 3 lb. of 96 to 98 or about 4 to 6 lb. of 43 per 100 lb. of bath material to maintain the correct cyanide concentration, when the operation is conducted at 1500 to 1550 deg. F. Higher temperatures decompose the cyanide more rapidly and consequently larger quantities must be added to maintain the strength.

Materials popularly known as 43 and 27 contain that amount of sodium cyanide respectively, the balance of each mixture consisting of equal parts of sodium chloride and sodium carbonate. The 43 grade is used for hardening medium-carbon steel and for producing a slight case on low-carbon steel. The strength of the bath is frequently maintained by addi-

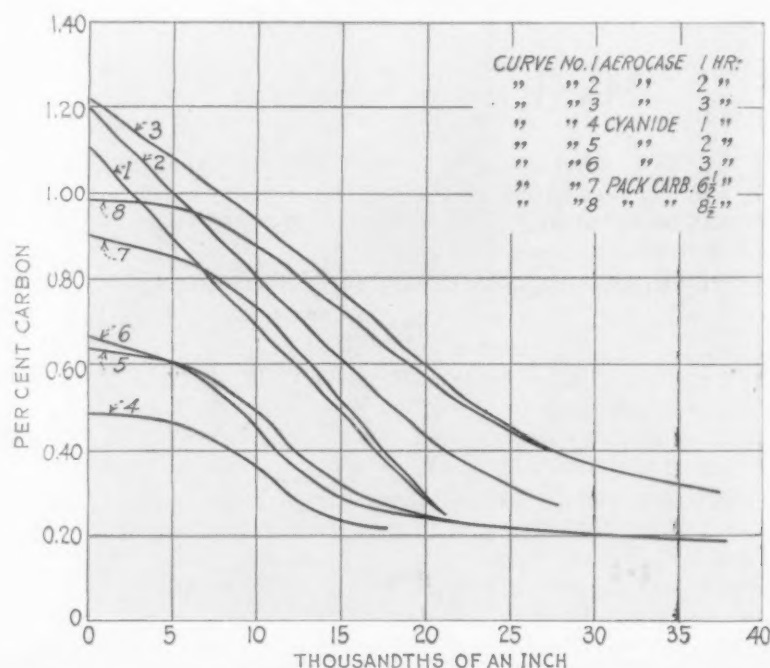


Fig. 1.—Carbon distribution from the use of different carburizing media on an S.A.E. 1020 steel at 1600 deg. F.

tions of 96 to 98 grade. The 27 grade is used almost exclusively for hardening medium and high-carbon steels requiring no case. These mixtures fume less than the 96 to 98 because of the lower vapor pressure due to the sodium chloride. Sodium cyanide is the actual active case hardening agent in these mixtures. Failure to maintain the correct concentration results in lack of case depth and hardness.

The use of temperatures in excess of 1550 deg. F. results in rapid deterioration of the cyanide and does not increase the rate of penetration. Experimental work has demonstrated that the depth of case and its carbon content are less when steel is treated at 1600 deg. F. than at 1550 deg. F. for the same time. The carbon penetration is uniform throughout the bath at temperatures below 1550 deg. F. while at 1600 deg. F. it varies from the top to the bottom of the bath.

This lack of uniformity is quite noticeable when comparatively deep pots are used, and is illustrated by heating a wire in a 30 per cent cyanide bath 15 in. in depth. In this experiment the wire reached to the bottom of the pot and was treated for 1 hr. at 1600 deg. F. and quenched in water. The wire was broken and the depth of case measured at 2-in. intervals. It varied from 0.013 in. at the top of the bath to 0.004 in. at the bottom, the top 8 in. of the bath being fairly uniform in depth of case produced.

This lack of uniformity was apparent when treating triple notched Izod bars suspended vertically in sodium cyanide at 1600 deg. F. The Rockwell hardness readings varied from the top to the lower end of the 5-in. bars, the hardness of the lower end being invariably less than at the top and amounted to nine points in the case of S.A.E. 4615 steel, treated for 1 hr., and 19 points in the case of 1020 steel treated for 2 hr. Other steels showed marked differences in hardness.

General Rules for Using Sodium Cyanide

General instructions for sodium cyanide case hardening are summarized as follows:

- (1) Select a compound of correct analysis for the job.
- (2) Use a pot of correct dimensions. Pots 18 in. in diameter by 18 in. deep or 24 in. long by 15 in. wide and 15 in. deep have proved most satisfactory and economical for heavy production schedules.
- (3) Maintain a cyanide concentration of 30 per cent where a case depth of 0.005 in. is desired.
- (4) Keep the bath free from sludge.
- (5) Do not operate at a temperature higher than 1550 deg. F.

The Aerocase Process

Sodium cyanide baths are rarely used to produce case depths greater than 0.010 in., as beyond this point the rate of penetration is very slow and is not economical. This limitation of sodium cyanide led to a comparatively recent development in liquid bath case hardening known as the Aerocase process. This process uses a molten salt bath Aerocase compound No. 510 to which case hardening properties are imparted by the addition of small quantities of an activating material Aerocase compound No. 28.

The characteristics of this process are:

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TWO processes for liquid carburizing or case hardening are discussed in this article: Sodium cyanide compounds and calcium cyanide mixtures.

Case hardening by sodium cyanide and mixtures is fully reviewed, with experimental data covering the rate of deterioration of the cyanide. Five general instructions for its use are included.

The calcium cyanide or Aerocase process is discussed in detail, with the method of operating the bath and the results obtainable covered.

This article is based on a paper presented by Mr. Moffett at a symposium on carburizing conducted by the New York chapter of the American Society for Steel Treating.

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- (1) The case produced is of uniform depth, extremely hard and is not brittle.
- (2) Only 3 hr. at a temperature of 1600 to 1625 deg. F. are required to produce a case of 0.032 in.
- (3) The bath during operation at 1600 deg. F. fumes only to a slight extent; the fumes are not irritating.
- (4) The molten bath has no corrosive action on the pot.
- (5) The bath can be used in the temperature range from 1425 to 1650 deg. F.
- (6) The bath can be used as a neutral heat-treating medium or for carburizing by varying the quantity of activating material added.
- (7) The activating ingredient is calcium cyanide.

This bath is extremely useful in producing cases in the range of 0.005 in. to 0.032 in. but is not limited to these depths. Carburizing temperatures of 1650 to 1700 deg. F. accelerate the rate of carbon penetration so that case depths greater than 0.032 in. can be produced in 3 hr. The temperature to be maintained and the period of immersion are determined by the characteristics of the steel and the hardness and depth of case it is desired to produce.

The case hardening operation is carried out in the usual furnace and pot equipment. To start a fresh bath, compound No. 510 is introduced into a new or thoroughly cleaned pot and melted, additions being made as the material melts completely. The level of the bath, when loaded with steel to be treated, should be about an inch below the top of the pot. When the molten salt has reached the temperature of 1400 deg. F. a quantity of Aerocase compound No. 28 is added according to the proportions required, as figured below. It is allowed to melt and react for 10 min.

This first addition of the activating material causes

the impurities and dirt adhering to the pot to collect at the surface of the bath as a black scum. This should be skimmed off with a perforated ladle. When the temperature of the bath reaches that at which the case hardening operation is to be performed, a second addition of compound No. 28 of equal weight to the first is made. The bath should now be ready for use.

The amount of compound No. 28 to be added varies from $\frac{1}{2}$ to 1 per cent of the weight of compound No. 510 contained in the pot (110 lb. of Aerocase compound No. 510 in the molten state occupies 1 cu. ft. of space). The concentration of the activating compound No. 28 in the bath must be maintained during operation to insure the production of a uniform case of the desired depth and hardness. This is done by the addition every hour of an amount of compound No. 28 as figured above. Additions of a higher percentage, say $\frac{3}{4}$ to 1 per cent, are recommended only when the operating temperature is above 1600 deg. F. and the surface of the steel treated is very large.

There is almost no volatilization of salts from this bath, and consequently the temperatures used may be considerably higher than with other baths. Furthermore, the molten bath is extremely fluid and there is very little loss of the salts by adherence to the work removed from the bath. Experience has shown that $2\frac{1}{2}$ lb. of compound No. 510 should be added to the bath during continuous operation for every pound of the activating material, compound No. 28, which has been added.

Results on Certain Steels

Results obtainable by use of the Aerocase process have been determined by laboratory work and compared with those obtained by use of cyanide and by pack carburizing. The steels used in this investigation were: S.A.E. 1015, 1020, 2315, 3115, 5115, 6116, and 4615.

Standard triple notched Izod bars were used for the determination of the hardness and impact values. Round bars, $\frac{3}{4}$ in. in diameter by 6 in. long, were used for the determination of the carbon concentration and penetration.

The carburized pieces were treated as follows: All specimens were packed in a commercial carburizing compound in heat-resisting alloy boxes of the approximate dimensions, 18 in. by 9 in. by 14 in. deep. The boxes were charged into a furnace large

enough to hold 20 such boxes and heated at 1650 deg. F. for a total furnace time of $6\frac{1}{2}$ hr. and $8\frac{1}{2}$ hr. Approximately $4\frac{1}{2}$ to 5 hr. of this time were required to bring the boxes up to temperature.

After the specified time had elapsed, the boxes were removed from the furnace and were allowed to cool to atmospheric temperature before they were dumped. The round test bars were then thoroughly cleaned and successive cuts of 0.005 in. on the radius were removed in a lathe, the chips subsequently being analyzed for carbon by the combustion method. The Izod bars were reheated in an oil-fired muffle furnace at 1420 deg. F. Sufficient time was allowed for the specimens to become thoroughly heated through. The plain carbon steels were quenched in water and the alloy steels were quenched in oil.

Similar Izod bars and round bars were treated in the Aerocase bath, heated in an automatically controlled electric furnace at 1550 and 1600 deg. F. for periods of 1, 2 and 3 hr. The carbon bars were cooled in lime and subsequently cleaned and sampled for the carbon determination. The Izod bars of the plain carbon steels were quenched in water and the alloy steels were quenched in oil. A similar procedure was used in the treatment of the samples in a bath containing 30 per cent of sodium cyanide, the cyanide concentration being checked by analysis and corrected every half hour of operation.

The results obtained by these three methods of treatment have been tabulated and a chart, Fig. 1, shows the figures relating to the S.A.E. 1020 steel. This steel is a good one to study, as it is used for so many purposes.

No wide variation in the rate of carbon penetration or concentration is to be noted in the different steels when treated in the same bath. The hardness readings vary somewhat according to the analysis of the steel, while the impact values, as might be expected, do show a fairly wide variation. For instance, a bar of S.A.E. 1020 steel treated for 3 hr. at 1550 deg. F. in the Aerocase bath had an impact value of $4\frac{1}{2}$ ft. lb., while a bar of S.A.E. 6115 steel treated in a similar manner showed an impact value of 38 ft. lb. Variations of similar magnitude were shown by these two steels when treated in sodium cyanide.

It is interesting to note the difference in the shape of the curves representing carbon distribution in

Results Obtained from Carburizing S.A.E. 1020 Steel

		1550 Deg. F.			1600 Deg. F.		
		1 Hr.	2 Hr.	3 Hr.	1 Hr.	2 Hr.	3 Hr.
Depth of case, inches	Aerocase	0.013	0.020	0.024	0.016	0.025	0.030
	Cyanide	0.010	0.016	0.018	0.010	0.012	0.015
Carbon content of outer 0.005 in. of case, per cent	Aerocase	0.90	0.98	1.02	1.00	1.10	1.15
	Cyanide	0.62	0.72	0.74	0.50	0.63	0.63
Hardness Rockwell "C"	Aerocase	59	63	65	61	63	64
	Cyanide	50	59	60	53	58	61
Impact value in foot-pounds	Aerocase	7.0	4.5	4.5	5	4.7	4.3
	Cyanide	6.0	4.0	4.0	3.5	4.5	3.5
Pack carburized to a case depth of (inches)		0.019 ($6\frac{1}{2}$ hr.) at 1650 deg. F.			0.031 ($8\frac{1}{2}$ hr.) at 1650 deg. F.		
Carbon content, per cent		0.88			0.99		
Rockwell "C"		56.5			58		
Impact value in ft.-lb.		3			3		

Fig. 1. Curves 4, 5 and 6, illustrating the results obtained in sodium cyanide, are similar in shape and slope to those obtained by pack carburizing, while curves 1, 2 and 3, representing the results obtained in the Aerocase bath, are almost straight lines. Experience has shown that the case represented by these curves is well tied in to the core and does not chip or spall.

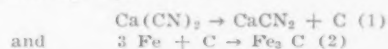
The Aerocase process has been called a liquid carburizing process. Its claim to this classification is illustrated by Fig. 2. Experimental work has shown that carbon and nitrogen are added in about equal amounts by sodium cyanide. This is readily apparent in the outer portion of the case when the percentage of carbon originally present in the steel is deducted from the carbon content of the case.

Looking at the NaCN curves we note carbon 0.56 per cent. If we deduct 0.20 per cent, we have 0.36 per cent added carbon. The nitrogen is 0.38 per cent, a ratio of carbon to nitrogen of about 1 to 1. Looking at the Aerocase curves, we note carbon 0.98 per cent. Deduct 0.20 per cent and we have 0.78 per cent added carbon. The nitrogen in the same portion of the case is 0.25 per cent, or a ratio of carbon to nitrogen of 3.1 to 1.

A comparison of the sodium cyanide and Aerocase bath shows marked differences. Naturally the question arises, why? Especially as the active reagent in both baths is a cyanide and as its concentration is greater in the less active bath, being in the average sodium cyanide bath in the neighborhood of 30 per cent and only between 0.2 and 0.3 per cent in the Aerocase bath.

The answer lies in the fact that, in the Aerocase bath, calcium cyanide is the active reagent, and its chemical reactions in case hardening are entirely different from those of sodium cyanide.

The mechanism of the absorption of carbon by iron or steel in the Aerocase bath can be represented by the following equations:



That the reaction represented by equation (1) occurs can be demonstrated by increasing the calcium cyanide content of the Aerocase bath to several per cent. In such a bath carbon is deposited on the surface of the metal as a layer that can be scraped off. This deposition is due to the fact that when the calcium cyanide content is very high, the rate at which reaction (2) takes place is not rapid enough for the steel to take up the carbon liberated according to reaction (1).

The reaction mechanism in a sodium cyanide bath is much more involved and, though considerable experimental work has been done, the problem has not been entirely solved. That the reaction mechanism is different from that in the Aerocase bath is indicated by the difference:

First, in the reaction between sodium carbide and nitrogen and that of calcium carbide and nitrogen. In the first case the reaction is

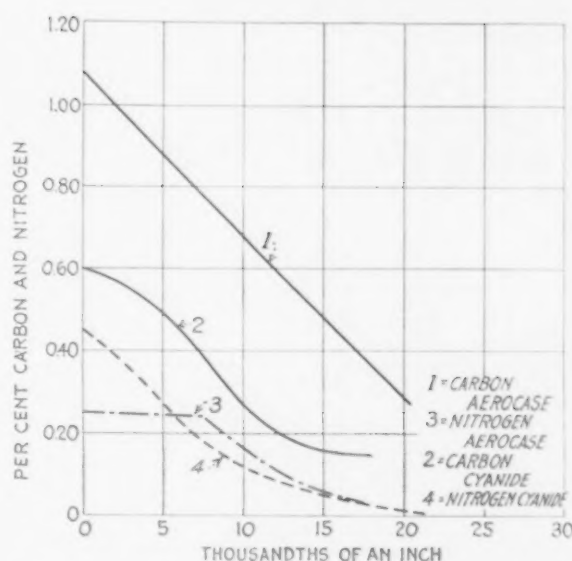
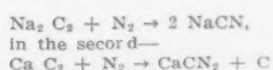
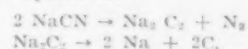


Fig. 2.—Additions of carbon and nitrogen by Aerocase and sodium cyanide to an S.A.E. 1020 steel at 1550 deg. F. for 2 hr.

and, second, in the reaction of the two cyanides when heated. The decomposition of sodium cyanide is represented by the equations:



and the decomposition of calcium cyanide by the equation,



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Expansion in Electric Steel Output of the World

ONLY recently have data become available covering the detailed output of electric steel in 1929 for all countries of the world. From these it is now possible to compile a table giving the electric steel production of the countries which produce this grade of steel. The data for 1929 compared with 1928, and in some cases with 1913, are as follows, in gross tons:

WORLD ELECTRIC STEEL OUTPUT			
	1929	1928	1913
United Kingdom	86,800	78,400	.....
United States	951,431	802,269	34,011
France	151,001	128,299	21,124
Germany	209,277*	195,761*	88,881
Belgium	14,450	.....	.....
Luxemburg	9,562	.....	.....
Japan	40,000(est.)	34,473	4,329(1918)
Italy	200,000(est.)	190,000(est.)	36,948(1917)
Poland	18,317	18,614	16,187
Sweden	112,702	85,886	2,276
Canada	52,760	30,014	449

*Includes crucible steel.

Thus the total world electric steel output for 1929 was approximately 1,846,600 tons, which compares with about 1,586,700 tons in 1928—an increase for 1929 of about 16 per cent.

American output, both in 1929 and 1928, was easily more than 50 per cent of the world total. In 1913 Germany was easily the leader, but holds second position now. The expansion for Italy since 1917 is outstanding, as is also that of Sweden.

It is probable that 1930 will make a poor showing compared with 1929. The data will not be available for several months.

NEW CANADIAN MILL MAKES BIGGER RAILS

By A. F. KENYON

Steel Mill Engineer, Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa

DEMANDS of Canadian railroads for longer and heavier steel rails has necessitated the complete rebuilding and electrification of the rail and structural mill of the Algoma Steel Corpn., Ltd., Sault Ste. Marie, Ontario. The first steel was put through the new mill on Feb. 3, 1931, and the mill was put into regular production Feb. 16, rolling an order of 30,000 tons of 130-lb. rails for the Canadian Pacific Railroad. The mill is capable of rolling 100 to 130-lb. rails at rates up to 150 gross tons an hour, and produce a monthly output of about 40,000 tons of rails, and somewhat smaller tonnages of beams, channels, angles and other structural shapes.

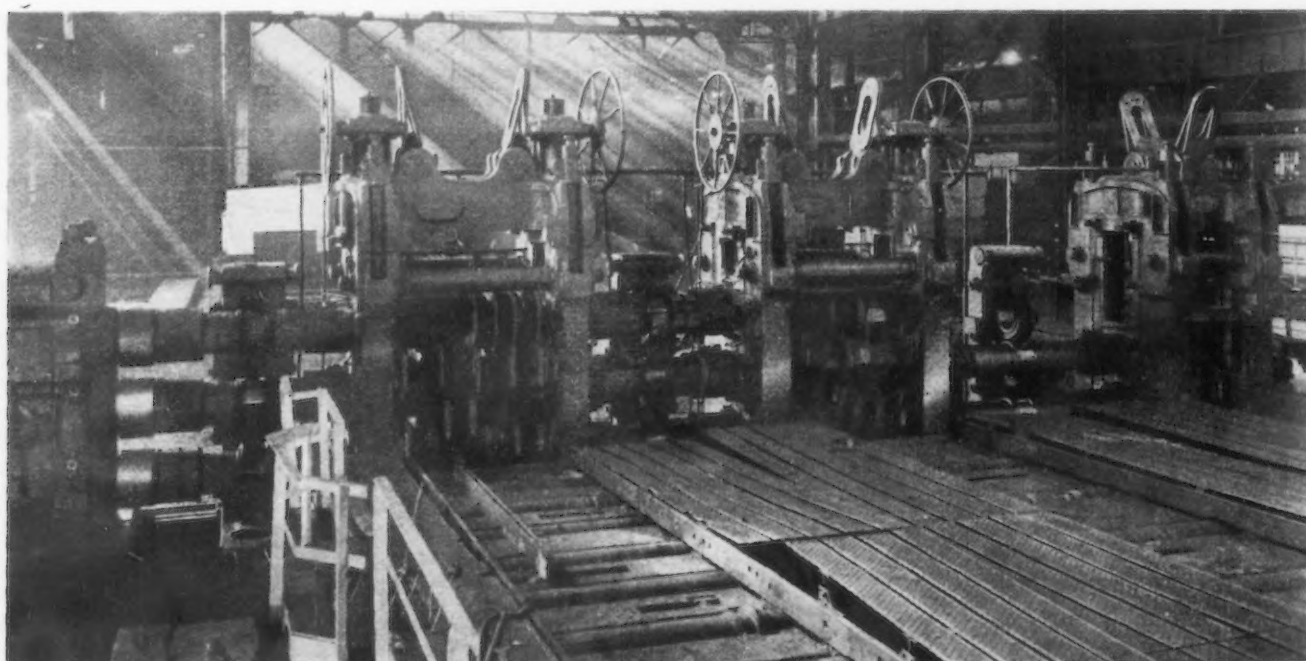
The Algoma Steel Corpn. operates four blast furnaces, two of 275 tons capacity, each, and the others of 500 and 650 tons capacity respectively, producing pig iron for the merchant trade and for refining to steel in the company's open-hearth plant. The open-hearth plant includes eight 60-ton and four 85-ton

furnaces, giving the company an annual steel ingot capacity of about 700,000 tons.

Initial rolling of the 26-in. x 26-in., 13,500-lb. ingots is in an electrically-driven 35-in. reversing blooming mill. Here the ingots are reduced to blooms 10 x 10-in. and smaller, depending upon the product being rolled in the finishing mills. The sheared blooms may be delivered into reheating furnaces preparatory to rolling to rails or large structural shapes in the new mill, or may pass directly to a steam engine-driven 32-in. reversing billet mill, to be rolled to billets of suitable size for further finish rolling to small angles, channels, beams, splice bar and merchant shapes, in one or the other of two merchant mills.

The new mill replaces an old mill which consisted of a 23-in. x 52-in. three-high roughing stand, a 23-in. x 48-in. three-high intermediate stand, and a 28 in. x 58 in. three-high finishing stand. The roughing and intermediate stands were driven by a

Delivery side of 30-in. three-stand rail and structural mill. The 110-ton overhead electric crane is used to lift out the mill stands and set in completely assembled spare stands, reducing to a minimum the time required to change sections.



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CLOSE control of speeds and all elements of rolling features the new rail mill of the Algoma Steel Corp. The schedule is so flexible, in the use of three traveling tables, as to permit three lengths to be in the three stands at once. The stands are all in line, driven from a single set of pinions and from a 5000-hp. motor.

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36-in. and 65-in. by 48-in. tandem compound condensing engine, capable of a maximum output of only about 1750 hp. At light load the speed reached 75 r.p.m., but with two bars in the mill the speed often dropped below 50 r.p.m., or only about 300 ft. a minute. The finishing stand was driven by a 40-in. by 48-in. simple non-condensing engine, capable of a maximum output of about 1800 hp. at speeds from 90 to 100 r.p.m. or about 650 ft. a minute delivery speed.

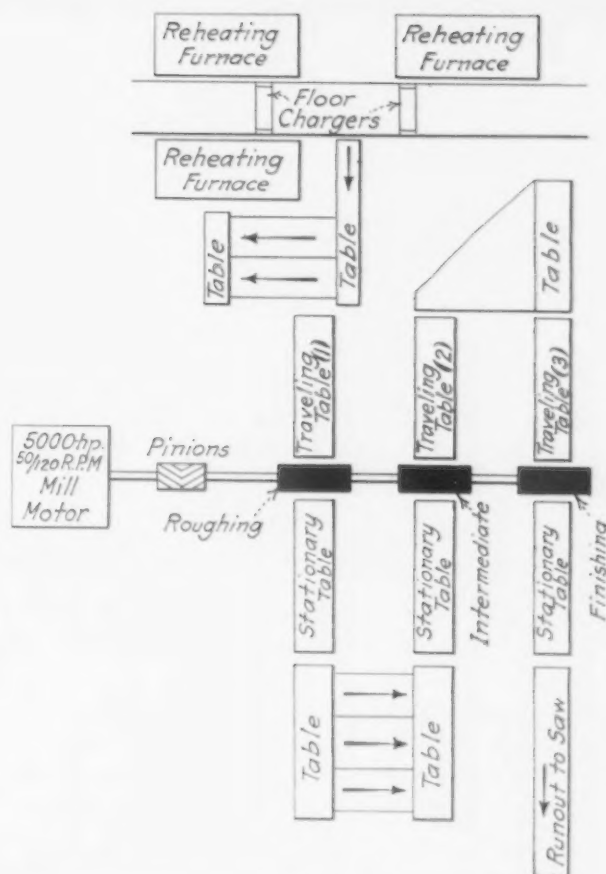
With the old mill and drive arrangement, it was not possible to roll rails heavier than 100 lb. to the yard, and the tonnage output was limited by the insufficient capacity and low speed of the driving engines. Also, it was necessary to roll rails from blooms about 8 in. x 8 in., and the blooming mill output was reduced below the tonnage which would be possible when delivering larger bloom sizes. This was an important consideration, as the blooming mill was pushed to the limit of its capacity to supply steel for both the rail mill and the other finishing mills.

Stands in Line, With One Motor

FURNISHED by the Mackintosh-Hemphill Co., Pittsburgh, the new rail mill consists of a 30-in. three-high pinion stand, and three stands of rolls, all in a single line. The roughing and intermediate stands are three-high, with rolls 31 in. in diameter by 68 in. long in the body. On rail schedules, only a single pass is required in the third stand and this stand is then set up two-high, with 31-in. x 36-in. rolls. Some structural shape schedules, however, require three passes in this stand, and it is then set up three-high, with rolls 68 in. long.

On the entering side, the mill is served by three traveling tilting tables, and on the delivery side by three stationary tilting tables. The traverse and table roll motions are motor operated, and the tilting of the tables is accomplished by air cylinders. Movements of the traveling tables on the entering side of the mill are controlled from operating pulpits on each traveling table, while the stationary tables on the delivery side of the mill are controlled from a pulpit which spans the tables, giving the operators a clear view of all three mill stands.

Rails of 130 lb. are rolled from 9 in. x 10 in., 3700-lb. reheated blooms in 11 passes, making six passes in the roughing stand, four passes in the interme-



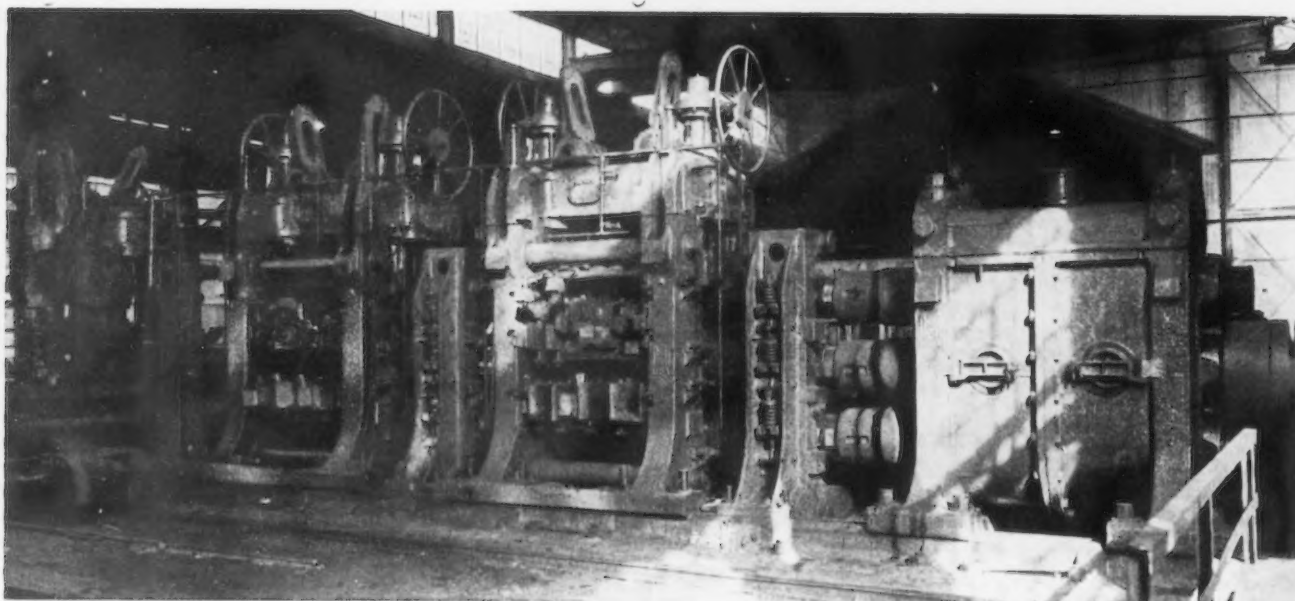
Schematic arrangement of mill elements, showing progression of material from reheating furnaces through the three mill stands and thence to hot saw.

mediate stand, and one pass in the finishing stand. One hundred-pound rails are rolled in 11 passes, also, starting from 9 in. x 9 in., 2825-lb. reheated blooms. In either case, the finished length is about 85 ft., cut to two standard 39-ft. rails.

When rolling rails, transferring from the roughing to the intermediate, and from the intermediate to the finishing, stands is all done by the traveling tables on the entering side of the mill. Passes 1 to 5 are handled by the first traveling table. Following the fifth pass the first table moves over to receive the next bloom from the approach table. The second table then receives the bar from pass 6, carries it to the intermediate stand and handles it for passes 7 to 9. The third table then receives the bar coming out of pass 10 and carries it to the finishing stand to enter into the eleventh pass. With this method of handling it is possible to be working a bar in each stand of the mill simultaneously.

On some structural shape schedules, fewer or more than 11 passes may be required, and in certain cases it is necessary to transfer the bar from the roughing to the intermediate stands on the delivery side of the mill. For this purpose, extension tables and a chain transfer are provided back of the roughing and intermediate stand tilting tables.

A complete set of spare mill stands is provided so that rolls and guides may be set up for the next schedule, while the mill is operating on the preceding schedule. Over the mill are two 85-ft. span



Entering side of 30-in. three-stand rail and structural mill. Part of one of the traveling tilting tables is shown at extreme left. Pinion housing appears at right, with roughing stand next, in center of picture.

traveling cranes, one built by the Morgan Engineering Co., Alliance, Ohio, with 30-ton main hoist and 10-ton auxiliary hoist, and the other built by the Dominion Bridge Co., with 110-ton main hoist and 20-ton auxiliary hoist. The larger crane is completely roller bearing equipped, and of sufficient capacity to handle a completely assembled mill stand, thus reducing to a minimum the time required for schedule changes.

Electrical Drive for Rolling

ALL three stands of the 30-in. rail mill are driven from one 5000-hp., 50 to 120-r.p.m., 700-volt, d.c., reversing mill motor, connected to the middle

pinion by a standard universal coupling. The motor is capable of developing a maximum operating torque of 1,180,000 lb.-ft., and a maximum emergency torque of 1,450,000 lb.-ft.

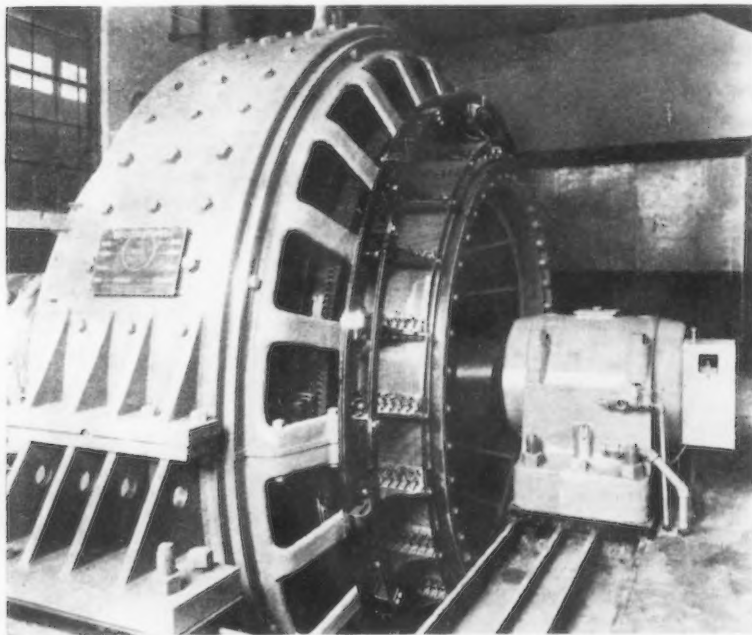
The mill motor is provided with rear inclosing end bells, and is force ventilated with filtered air, requiring 50,000 cu. ft. of air a minute. Dampers are provided in the air filter inlet, so that during cold weather the air may be recirculated, or during warm summer weather all outside air may be used.

Mill motor bearings are provided with oil rings, and are connected also to a circulating oiling system. The oil is continuously circulated, filtered and cooled at the rate of about 6 gal. a minute, and the complete system has a total holding capacity of about 750 gal. of oil.

Mill motor, ventilating equipment, and motor and mill circulating oiling systems are housed in a small brick building addition at one side of the mill building. A monorail hoist is provided to handle the lighter parts of the motor for maintenance or repair.

Space limitations permitted the location of only the mill motor at the rail mill; the main substation is located about 500 ft. distant. This substation houses the flywheel motor-generator set, exciter set and control and switching equipment. The flywheel motor-generator set supplying power to the 5000-hp. mill motor consists of two 2000-kw., 700-volt, 508 r.p.m., d.c. generators, a 4250-hp. 6600-volt, 3-phase, 60-cycle, 508 r.p.m. induction motor, and a 75,000-lb. steel plate flywheel having a stored energy capacity of about 125,000 hp.-seconds when running at full speed.

A 150-hp. 550-volt, squirrel cage induction motor, driving four small d.c.



Mill motor of 5000 hp., driving the 30-in. rail and structural mill. Although normally operating in one direction, the motor and its control are of the reversing type, to permit very rapid adjustments of speed between 50 and 125 r.p.m., to meet rolling conditions.

exciter generators, furnishes shunt and series excitation for the 5000-hp. mill motor and the two 2000-kw. generators. The secondary circuit of the 4250-hp. induction motor is controlled by an electrically reset automatic liquid slip regulator, which may be adjusted to limit the input to the motor-generator set to any desired value up to about 5000 kw. and to slow down the set so that the flywheel will give up some of its energy during maximum load conditions on the 5000-hp. mill motor.

Power for the operation of the substation equipment is purchased from the Great Lakes Power Co. The incoming power is at 11,000 volts, and the power company has provided a 4500-kva. outdoor transformer station to step down to the operating voltage of 6600.

Methods of Control of Power and Speed

A NUMBER of the control features were especially designed for the efficient operation of this type of rail and structural mill. Magnetic contactors control the several exciter and main fields. These contactors in turn are controlled by automatic operating and protective relays and by master switches at the rail mill. The main master switch, in a pulpit in the motor room overlooking the mill, gives five speeds from standstill up to the full field speed of 50 r.p.m., and six weakened field speeds between 50 r.p.m. and the maximum speed of 120 r.p.m. Operation of the motor and mill may be completely controlled from this master switch.

In normal service this master switch is set to give the maximum desired rolling speed and this setting is only infrequently changed. However, it is often necessary to slow down the mill, especially

for the early passes, in getting the steel to enter into the rolls. There has therefore been provided a dial selector switch on one of the control panels, and a pushbutton in the pulpit of the first traveling table serving the roughing stand.

Depressing the pushbutton acts to slow the motor down to the speed determined by the selector switch setting. Upon releasing the pushbutton, the motor accelerates to the speed determined by the main master switch setting. This method of control provides very flexible operation and permits the mill to run normally at the maximum rolling speed, and also permits the operator to slow down the motor to enter a piece, after which the mill resumes its high rolling speed.

Emergency stop pushbuttons in each pulpit enable any pulpit operator to trip the main circuit breaker and shut down the mill instantly, should any emergency arise.

In connecting up the mill it is desirable to be able to run the motor at very slow speed, while lining up the couplings, and also to bring the motor to a dead stop and prevent creeping. There is therefore provided an "inching" master switch to give considerably slower speeds than can be obtained with the main master switch, and also to close a generator field neutralizing connection to kill the generator residual voltage and bring the roll motor to a dead stop.

This complete electrical drive equipment was designed and built by the Canadian Westinghouse Co., Hamilton, Ontario. The 5000-hp. mill motor is the largest d.c. machine ever built in the Dominion of Canada, and also is the largest industrial motor drive to be installed there.

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Machineability of Screw Stock Steel

THE mechanism of chip formation in the machining of automatic screw steel has been discussed by A. Wallichs and H. Opitz (*Stahl und Eisen*, Dec. 18, 1930). Under tests made to correspond with industrial conditions, steels of the composition 0.07 to 0.15 per cent carbon, 0.06 to 0.12 per cent phosphorus, and 0.1 to 0.2 per cent sulphur, were studied as to life of cutter, chip formation and character of surface obtained.

The life of the cutter was practically the same in continuous cutting as in interrupted cutting. By determining the life of the tool for different cutting speeds, it is possible to decide the most practical speeds for given depths of cut and feeds. Thus the speed compatible with a given tool life was found to be twice as great with screw steel as with an equally strong steel similar in composition except for a lower sulphur content. Annealing the stock improved the tool life.

The quality of the machined surface was found to depend on the mechanism of chipping. In "tear-chipping," cracks develop in the material ahead of the tool, which result in irregular depth of cut and

uneven pressure on the tool. Best results were obtained when the metal flowed smoothly over the tool, forming "flow-chips." Smoother and cleaner surfaces resulted as the speed was increased, flow chips being formed instead of tear chips.

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A pocket-size leather-bound collection of graphs, entitled "Coal," thoroughly indexed and with explanatory description, has been put together by A. T. Shurick, dealing with the coal industry and related industries in a most intimate manner. The subject is divided into eight general topics: Weekly production and movement, prices, consumption, general and annual distribution, fuel production, coal substitutes, operating economies and coal securities.

In going through the series of topics the use of fuels in various lines of consumption, such as public utilities, railroads, etc., is outlined in considerable detail, as well as the use in general manufacturing, in making coke, in heating of buildings and a great many other outlets. Geographic distribution is taken care of and also a correlative topic, the distribution of water-power developments and water-power resources. The book has been published by the author at 1775 Broadway, New York, and sells for \$12.

"ALLOY BUILDING" OPENS WIDER

By DR. PAUL D. MERICA

Assistant to President,
International Nickel Co., New York

A BRIEF glance at the economic and technical history of the non-ferrous metals will demonstrate, I think, that they have made progress. I dislike to offer you statistics, almost as much as you probably resent having to study them, but it is worth while to assess the position of this heterogeneous thing which I shall henceforth call, in the interests of orthodoxy—the non-ferrous metal industry.

First of all, how large is it? According to Table I, representing the approximate consumption in the United States of the various metals, it is evident that, whereas some 47,700,000 net tons of pig iron and 63,200,000 tons of steel were produced (and presumably consumed) in the United States in 1929, the gross American consumption of new refined non-ferrous metals did not exceed about 2,500,000 tons.

Whereas the value of the American pig iron consumption in 1929 was about \$900,000,000, and that of the steel consumption, \$1,900,000,000, the total value of the consumption (in the arts, excluding the value of gold and silver and for monetary purposes) of non-ferrous metals did not exceed about \$900,000,000.

These figures are at least indicative of the world position in respect to these matters since the United States uses generally from 50 to 60 per cent of the world's production of metals, and they demonstrate

perhaps that we are still economically minded and use more of the cheaper metal, iron!

Non-Ferrous Metals Growing in Importance

Non-ferrous metals are thus still hopelessly out-distanced by iron and steel in the economic race of the metals. But the facts in Table II indicate pretty clearly that, although behind, they are not today still losing ground, but are actually gaining on "the metals that are iron." When the American annual consumption rates of the metals during the post-war years are compared with the average of the latest pre-war years, it is evident that relatively more of the principal non-ferrous metals were used during recent years than pig iron.

Non-ferrous metals have been gaining on iron and steel and, insofar as compatible with production position, this gain would seem to be a stable economic trend. It is most striking in the case of the newer metals, aluminum and nickel. (It should be noted in this connection that the consumption figures for non-ferrous metals generally relate to new or virgin production and should for this purpose be compared rather with our pig iron production than with that of steel for which from 30 to 50 per cent of steel scrap is currently used.)

This fact should not unduly surprise us. Aside from the tremendous growth of the electrical industry, which has had much to do with the rapid increase in the use of the metals, particularly copper, I think we may fairly claim that the "standard of living" in metals is improving, as it is in the other features of our daily life. Just as the public demands, and will pay for, better houses, package food, faster automobiles and louder radios, so it is also, indirectly and often very directly, demanding metals and alloys of greater durability and better appearance as well as of improved properties generally.

Uses of Non-Ferrous Metals

Presumably the interest which any such assembly as this may have in non-ferrous metals is in what they are doing for engineering and industry. It may be worth while first to review briefly the "what" and "why" of metals before talking about the "how"!

Although, as has been pointed out, the non-ferrous industry is not (in the United States at least) so large as the steel industry, it is certainly more complex both in metallurgy and in the variety and nature

TABLE I—VALUE OF UNITED STATES CONSUMPTION
OF NEW METALS IN 1929

	Amount in 1000 Net Tons	Price	Value in \$1,000
Pig Iron	47,700	\$18.00	860,000
Steel*	63,200	30.00	1,900,000
Copper	889	.18	320,000
Lead	692	.07	97,000
Zinc	564	.065	73,000
Aluminum	177	.24	85,000
Nickel	46.9	.35	33,000
Tin	(75)	.45	67,000
Antimony	13.4	.09	24,000
Gold	3,000,000†	20.00	60,000
Silver	40,000,000†	.53	21,000
Platinum	150,000‡	65.00	9,700
Total non-ferrous			789,700
		(estimated)	900,000

*Total production for ingots and castings.

†Used in the arts only—excluding monetary use.

‡Ounces.

FIELD TO NON-FERROUS METALS

of its products. There are some 175 different non-ferrous metals and alloys (excluding precious metals) commonly used in industry in the United States and, if we should accept the dreams of inventors and the minor modifications of standard composition types actually still in current use, this list could be multiplied indefinitely. Campbell published a list of 2500 non-ferrous alloys in 1922. We still have individual tastes in metals!

What are they all used for? I have attempted in Table III to analyze the industrial use of metals according to that characteristic or property which predominates in or determines the use. It is evident that the use of metals because of resistance to corrosion is still a dominant one, although for the first time in history the non-ferrous metals are to have competition in this field from the ferrous group in the form of the so-called rustless steels, in some of which, however, non-ferrous metals, particularly nickel, play an important role.

Yet that is far from being the whole story. Applications depending on electrical or electrochemical properties claim also a very large portion of non-ferrous metal consumption. These electrical uses are among the most interesting and important.

In order perhaps to retaliate for the ferrous invasion of the corrosion field, the non-ferrous alloys are in turn beginning to compete with steel in the structural field, although this is true only of aluminum in substantially pure form, since nickel enters the structural field only in combination with steel as nickel steel.

And we should not overlook those traits in certain non-ferrous metals which we characterize as ease of fabrication, particularly of melting and casting, and which actually, quite aside from other considerations, determine the consumption of substantial amounts.

Stability at High Temperatures

One of the newer alloy fields in which engineers are much interested is that of alloys to "resist heat or high temperatures" as we rather loosely put it. Metallurgical operations of heat treating, of roasting and of heating, high temperature operations in the chemical, glass and oil industries, as well as the diversified operations of combustion generally and of electrical heating, are demanding metallic materials of light section and good thermal conductivity (relatively) to replace refractories used in the past.

THERE are 175 different non-ferrous metals and alloys commonly used in industry in this country and in terms of consumption they are gaining on iron and steel. Non-ferrous alloys developed to resist high temperatures are finding wide adoption. The "building" of alloys with "disperse" agents enables non-ferrous metals to compete in mechanical properties with structural and even alloy steels. It multiplies the variety of characteristics that may be imparted to a given base metal or alloy.

"Dispersion hardening," said Dr. Merica in a recent address, here abstracted, before the New York members of the American Society for Testing Materials, "is one of the methods which will be employed more and more in the future by the non-ferrous metal industry in sharpening its tools for engineering and industrial competition."

This demand is met today, as is well known, both by non-ferrous and ferrous alloys—the chromium-nickel, chromium-nickel-iron or the chromium-iron alloys—and it may surprise some to learn that low-

TABLE II—CONSUMPTION OF NEW, PRIMARY METALS IN UNITED STATES

(in 1000 Net Tons)

(Data from Mineral Industry)

	Pig Iron Production	Copper	Lead	Zinc	Aluminum*	Nickel
1930	28,200					32.74
1929	47,700	889	692	564	177	46.90
1928	42,700	804	658	578	163	33.50
1927	41,000	711	663	516	154	19.40
1926	44,200	785	718	557	152	21.90
1925	41,100	730	656	500	132	20.20
1924	35,200	715	603	448	115	17.50
1923	45,300	696	573	446	110	19.90
1922	30,500	463	492	373	76	2.80
1921	18,700	298	445	204	54	2.00
1921 } 1922 } 1922 }	Aver. 24,600	381			65	
1913	34,700	354	419	295	44	9.20
1912	33,300	395	417	340	32	8.30
1911	26,400	339	383	280	16	2.40
1911 } 1912 } 1913 }	Aver. 31,500	363	406	305	31	6.70

*Includes secondary aluminum.

melting aluminum even plays a not unimportant role in this field of application both in the form of calorized steel and as aluminum bronze for valve seats and glass molds.

I mention this field briefly because of its evident importance in the growing field of high-temperature engineering and of the future which lies before it for those alloys which can meet the varied and severe conditions of high-temperature service—and to indicate to those who may not be familiar with the facts, how the useful properties of these so-called heat-resistant alloys compare with their nearest competitor, steel.

Alloys of the chromium-nickel-iron type, and with varying amounts of iron, from perhaps 15 up to 70 per cent, have at ordinary temperatures mechanical strength comparable with that of medium carbon steel and substantially inferior to that of heat-treated alloy steel. At temperatures above about 1000 deg. F., however, the stable strength (often loosely called "creep" strength) of the steels, and indeed of all other common alloy materials, falls substantially below those of these special alloys.

Fahrenwald cites, for example, the design stress limit for an alloy cast steel at 900 deg. F. to be 4000 lb. per sq. in. and at 1700 deg. F. 100 lb. per sq. in., whereas a typical chromium-nickel-iron alloy will yield design limit stresses at these temperatures of 10,000 and 1500 lb. per sq. in. respectively; or from two and one-half to 15 times that of steel.

Even more important is the chemical stability of these alloys, which at temperatures from 1500 to 2000 deg. F. oxidize in air about one-fiftieth to one-hundredth as rapidly as steel. In an actual test, these alloys showed a loss during 350 hr. at 1800 deg. F. of 0.002 in., whereas steel under the same conditions had oxidized to a depth of $\frac{1}{4}$ in.

In practical service, as for example in carburizing boxes for the heat treatment of steel, some of these alloys currently withstand from 4000 to 10,000 hr. of service at temperatures from 1600 to 1750 deg. F., whereas iron and steel boxes last only from 100 to 250 hr. Chemical retorts have been known to give satisfactory service for 12,000 hr. at 2000 deg. F. This is a most useful and interesting group of alloys, to which several of the society's committees are devoting active attention—the society's principal problem in connection with them appears to be whether they are ferrous or non-ferrous alloys.

Making Non-Ferrous Metals More Useful

I have cited some of the principal current developments in the industry—illustrating the manner in which it is meeting modern demands for metallic materials, how the alloys are being, as it were, domesticated and taught greater and better performance. Such a tale could not be complete without reference to many others—the improvement of marine condenser operation through the use of nickel-copper and aluminum-base alloys; the production of copper alloys substantially free from season-cracking; improvement in plating practice and in durability of plated articles; growing application of rare metals such as cadmium,

selenium, magnesium, tantalum, beryllium and the platinum metals. Time is not available.

"Alloy Building"—a New Term

But in pursuit of the same general purpose, may I instead discuss for a moment a new principle in what might be termed "alloy building"—a principle which is of importance in connection with the present use of alloys and which, I believe, will be of even greater importance in the future?

The art of designing alloys, if I may be permitted the expression, certainly lags behind those of designing structures, be they structural, mechanical or electrical—in point of flexibility and variability. We can build bridges, machine tools and motors of almost any size and to fulfill almost any performance requirement. We cannot do this with alloys, nor indeed with materials generally; we are sharply limited in the properties of our raw materials, and particularly with respect to desired combinations of them. If we want high strength, we must accept the feeble corrosion resistance of steel, and if we want corrosion resistance we are obliged, if you please, to be content with the relatively poor mechanical properties of brass.

Hardening by Dispersion

Whether because of lack of metallurgical ingenuity or because of the inherent refractoriness and immutability of the subject matter, we place metallic materials at the disposal of the engineer almost as nature gave them to us, and with rather meager human dressing in the way of variety and adaptability. Yet the industry is constantly striving to improve its art of alloy building—and its progress in this respect may well be illustrated in the newer method of hardening and strengthening metals or alloys by what is called "dispersion" or "precipitation" hardening.

A detailed description of the method, which was discovered and developed first in connection with duralumin, would here be out of place. We are here concerned only with the simplified facts:

- (1) that "hardening" and strengthening of this nature may be secured by inducing throughout the matrix of a metal or alloy a fairly dense precipitate of very finely dispersed, almost colloidal particles of a second constituent; (2) that an alloy subject to such hardening can be hardened or softened at will by the proper heat treatment, and (3) that, in order to de-

TABLE III—ANALYSIS OF INDUSTRIAL USES FOR METALS IN UNITED STATES

(Estimated from Mineral Industry Data for 1929)

	Copper	Lead	Zinc	Aluminum	Nickel
Electrical	55	—	—	16	7
Electrochemical	—	20	5(?)	—	2
Corrosion-resistance	30	25	85	25	46
Structural and bearings	5	3	—	40	37
Casting properties	—	30	5	10	—
Non-metallic	*	15	5	—	—
Miscellaneous	10†	7	—	9	8‡

*Copper sulphate not included.

†Chiefly for thermal conductivity.

‡Including 5 per cent for high temperature service.

TABLE IV—DISPERSION HARDENING OF METALS

	Hardened Condition Heat-Treated or Cold-Worked			Soft Condition Quenched or Annealed		
	Brinell Hardness	Tensile Strength	Elonga- tion	Brinell Hardness	Tensile Strength	Elonga- tion
Aluminum	55	30,000	5	25	14,000	35
Duralumin (6% Cu., Mg., Mn.)	95	60,000	20	55	30,000	12
Copper	100	65,000	5	40	33,000	60
Copper plus 6% Ni ₂ Si. (Corson)	200	115,000	16	70	45,000	55
Lead					2,000	—
Lead plus 2.5% Sb. (Dean)	25	9,000	—	12	4,000	—
Gold					15,000	—
18 kt. Red Gold (25% Cu.)	—	160,000	12	—	80,000	40
Nickel	175	135,000	5	100	65,000	50
Nickel plus 2.5% Be. (Siemens-Halske)	500	150,000	2	175	80,000	17
Copper-nickel (67% nickel)	200	150,000	5	130	75,000	50
Copper-nickel plus 4% Al. (Mudge)	300	175,000	20	140	90,000	50
Iron	150	80,000	5	75	40,000	50
Steel (0.50% C.)	500	250,000	10	175	80,000	20
Iron plus 12-25% Mo. (Sykes)	550	150,000	—	230	65,000	—

velop this characteristic in any alloy, metals or metallic compounds must be found which, in limited quantities, are soluble in solid solution in the base alloy at high temperatures and less soluble at lower temperatures.

We may secure from Table IV an impression of what is practically possible in this direction. "Dispersion" constituents have been found which, in amounts generally under 10 per cent, harden all of the commonly known metals, except perhaps zinc—and in the case of many or indeed most of these metals we know not one but several such constituents which confer hardening susceptibility. The increases of strength and hardness, which are in general possible by these means, are of the order of magnitude of 100 per cent and sometimes more when compared with the properties of the pure base metal. It is interesting that the hardness of such "hardened" metals or alloys is generally comparable with that of the same alloy when in the extreme cold work-hardened condition—but sometimes exceeds the latter.

The method has been applied to iron and we have the double possibility in that material, therefore, of hardening it in the conventional manner, a process related to its transformation, as well as by true dispersion hardening, not related to its transformation in any direct manner.

Six Dispersion Hardening Alloys Now in Use

At least six dispersion hardening non-ferrous alloys are today in commercial use, certain of them having tensile strengths in the neighborhood of 150,000 lb. per sq. in., able to compete in mechanical properties with structural and even with some alloy steels. Non-ferrous metals may therefore abandon their age-old mechanical inferiority complex with regard to steel!

But the important feature of this new principle or method, in my opinion, is its general applicability to all metals and alloys. Solubility-temperature relations in alloys, as well as in other substances, are generally of the nature required for dispersion hard-

ening, and in view of our present practical experience in dispersion hardening and the wealth of alloying compounds at our disposal, we may safely assume, I think, that one or more alloying metals or compounds may be found for any base metal or alloy which will confer upon it "dispersion" hardening characteristics.

In other words, it is today not going too far to expect to be able to "dispersion" harden any metal or alloy, in which for other or any reasons we happen to be interested. If we found an alloy combination which has the right set of chemical or physical characteristics—but is too weak or soft—it is very probable that it can be substantially improved in the latter respect and, with proper choice of "disperse" agent, its other properties are not likely to be much altered.

Universality of Application

Although I firmly believe in the universality of application of this new hardening method, I should not want to give you a false impression of the ease with which it may be generally applied. Certainly, in any particular case, investigation is required to find the proper "disperse" agent which will not interfere in other respects. But judging by our experience within the past 10 years in this relatively young art, our search for such systems is likely to be successful and we are reasonably well assured, therefore, of a far greater degree of variation and flexibility in at least one important set of properties of alloys than we have ever had before.

The moral, therefore, of this part of my tale is that in spite of the relative inertness of metallic materials, the art of designing alloys of specified properties and performance is making some real progress today—and, although in its infancy as compared with mechanical or electrical design, it will probably produce some exceedingly useful results as time goes on. Dispersion hardening is one of the methods which will be employed more and more in the future by the non-ferrous metal industry in sharpening its tools for engineering and industrial competition.

ELIMINATING WIDE FLUCTUATION IN OPERATING SCHEDULES

BY planning carefully the production of a highly seasonal article, the ammunition manufacturing division of the Remington Arms Co., Inc., Bridgeport, Conn., has been able practically to eliminate wide fluctuations in the operating schedules of its plant. This has assured a

majority of the employees jobs the year around, labor turnover has been materially reduced, the efficiency of workmen as reflected in the quality of their output has been increased, and manufacturing costs have dropped considerably. Raw and finished stocks are better balanced than heretofore, so that customers get more

N. Y. Form No. 82

LOADED SHELLS COMPARISON TWO YEARS

Week Ending _____

Description	RECEIVED IN WAREHOUSE THIS WEEK		RECEIVED IN WAREHOUSE CUMULATIVE		SHIPMENTS THIS WEEK		SHIPMENTS CUMULATIVE	
	192	192	192	192	192	192	192	192
New Club								
Nero Spec.								
Nero Game								
Arrow								
Shut Shot								
Misc.								
Total								
Air Rifle 4 in.								
Air Rifle 22 in.								
Orders Received This Week								
Orders Received Cumulative								
Orders on Hand This Date								
Warehouse Stock This Date								

REVISION of production schedules is based upon reports prepared by the billing department, copies of which are sent to the works manager, the sales manager and the plant superintendent. Production during the week is listed as received in warehouse, while in the second column cumulative production for the year to date is recorded. Shipments and orders received are also tabulated weekly and cumulatively, while orders on hand and warehouse stock are included. These forms constitute an up-to-the-minute record of activity in the major ammunition manufacturing divisions of the company.

201 Rev. Amm. Wks.

METALLIC AMMUNITION COMPARISON TWO YEARS

Week Ending _____

Description	RECEIVED IN WAREHOUSE THIS WEEK		RECEIVED IN WAREHOUSE CUMULATIVE		SHIPMENTS THIS WEEK		SHIPMENTS CUMULATIVE	
	192	192	192	192	192	192	192	192
R. F. Cages								
R. F. Blanks								
Total R. F.								
C. F. R. & R. Cages								
C. F. R. & R. Blanks								
C. F. T. & S. Cages								
C. F. M. Cages								
Total C. F.								
GRAND TOTAL								

Description	ORDERS RECEIVED THIS WEEK		ORDERS RECEIVED CUMULATIVE		ORDERS ON HAND THIS DATE		WAREHOUSE STOCK THIS DATE	
	192	192	192	192	192	192	192	192
R. F. Cages								
R. F. Blanks								
Total R. F.								
C. F. R. & R. Cages								
C. F. R. & R. Blanks								
C. F. T. & S. Cages								
C. F. M. Cages								
Total C. F.								
GRAND TOTAL								

The Iron Age, April 23, 1931—1351

workers have come to realize and appreciate the fact that sudden and drastic suspension of their services is not likely to occur.

Revisions Based on Weekly Stock Reports

After long-range production schedules have been determined, revisions are based upon weekly reports listing the items made by the principal manufacturing divisions. These reports are prepared by the billing department and copies are sent to the works manager, the sales manager and the plant superintendent. As shown in an accompanying shop form, the number of shells produced during the week is listed in the "Received in Warehouse" column. Shipments, orders received, total unfilled orders on hand and total warehouse stocks are listed in other columns.

Copies of each order entered, of the shipping memoranda and of the daily reports of the articles received at the warehouse from the manufacturing division go to the billing department to make up this weekly report. The orders, shipments and deliveries to warehouse of each item are tabulated in condensed form and posted on the books. At the end of the year the books or the warehouse records are checked against the annual physical inventory. Once a year the shipments of every item of loaded shells are summarized in a folder for distribution to the company's executives and other interested parties.

Production Attuned to Stocks and Sales

In the department handling the daily scheduling of shot shell loading, books are kept showing the warehouse stock of every item available for future orders. On each stock item a maximum figure is shown on the books. Planning of production is based upon the maintenance of a stock of each item in warehouse in the same proportion to its maximum figure as current total warehouse stock represents to the maximum allowable warehouse stock on the metallic cartridge line.

In the rim fire and center fire cartridge manufacturing departments, individually itemized sales figures are provided monthly to the production office, and the output of the loading department, as well as that of the departments producing the component parts of cartridges, is planned to keep pace with current orders for each item.

Operating Methods Individually Controlled

The production planning department does not attempt to specify in detail how and when each operation is to be performed in each department. The manufacturing plant is organized into six major units or divisions, at the head of each of which is a supervisor reporting to the factory superintendent. Each division has departments in charge of foremen.

The manner in which manufacturing operations are to be carried on is left to the discretion of the supervisor and his foremen. The production office has information as to the approximate time required to complete an order under conditions set up by the supervisor, but the only control it exercises is in supplying him with lists of preferred orders from time to time, which enable him to draw the items from his departments as they are needed. Whenever service and

economy clash, service comes first. This is a standing rule observed in all divisions of the company.

Scheduling of Production Varies

Scheduling of production in the various manufacturing divisions varies, depending upon the number of parts required for the finished product and the expected vacillation in demand. The empty paper shell division, for example, is supplied monthly by the production office with a schedule indicating the daily output of each item that probably will be required during the month. No other orders are supplied to this division, except those for special items which do not run into sufficient volume to necessitate regular scheduling. In such a case the orders always carry a delivery date. The schedules are made up primarily to insure an adequate supply of finished stock. They are so prepared, however, that a minimum of machine changes will be required from one month to the next. This reduces machine work and provides a steady flow of work with a minimum amount of material in process.

In the center fire shell and bullet manufacturing divisions, individual orders for a specified amount of each product are placed currently throughout the month at a rate calculated to keep all departments busy enough to produce the total specified volume. These orders are placed far enough in advance to allow the supervisor and his foremen ample time to deliver finished products at a rate at which they can make the most economical use of each order in arranging the work of the various departments.

In the manufacture of rim fire cartridges the variety of products is small and the volume of most items is large. Blanket orders for each product are issued in sufficient size to fill the company's needs for several weeks. In addition, a schedule for the total annual output is established, providing for proportional amounts of each of the major items to be turned out currently. These proportions, of course, are altered to conform with conditions at the moment.

Center fire and rim fire loading schedules are made up daily in order to maintain the proper warehouse stocks of each item. Such scheduling is done also to insure the most economic operations in the loading department and is influenced by the current supply of component parts available. Since rim fire and center fire cartridge sales are very erratic, the schedule of the loading department is measured partially by current orders for shipment, making necessary an almost daily checking of warehouse stocks.

The "in process" status of each order for center fire shells and bullets is determined weekly by compiling the number of each component part being manufactured in the shop. This compilation is made by each foreman by means of a weekly inventory covering every article in his department. This inventory requires only a short time every Saturday morning. Since there are always a few articles or orders which the production office wishes to move through the plant rapidly, a daily report is submitted by each foreman showing the production of each part by each operation in his department.

CALCULATING CONCAVITY AND CROSS FOR SHEET MILL ROLLS

By HARRY G. WIBLE
Foreman Roll Turner, Canton, Ohio

IT is necessary in dressing all rolls used for hot rolling of sheets, and where rolls are worked hot, to concave one or both rolls to allow for the extra heat expansion in the middle of the body of the roll over and above the expansion at the ends of the roll. This article discusses the dressing of sheet or tin mill rolls by the topping method in a lathe, and its relationship to the same work done in a roll grinder, where all measurements are in thousandths of concavity.

No attempt will be made to go into the various problems met in the proper concaving of rolls to suit the differing mill and steel conditions. But the writer wishes to give a correct formula by which it is possible to figure the exact concavity in a pair of rolls that has been given a known cross.

By cross we mean the distance one roll is crossed upon another as measured with a plumb line, or preferably, with a more improved method, the variable square. It is well to state that the old idea that the straight roll acts as a straight edge is erroneous, as the contact of the two rolls crosses the straight roll in a diagonal line (viewed from above) and hence is on a convex surface, with its convexity equal to one-half of the hollow-roll concavity. Also, a thing not generally understood is that the depth of concavity is not affected by the length of roll body, but only by the arc of the circle.

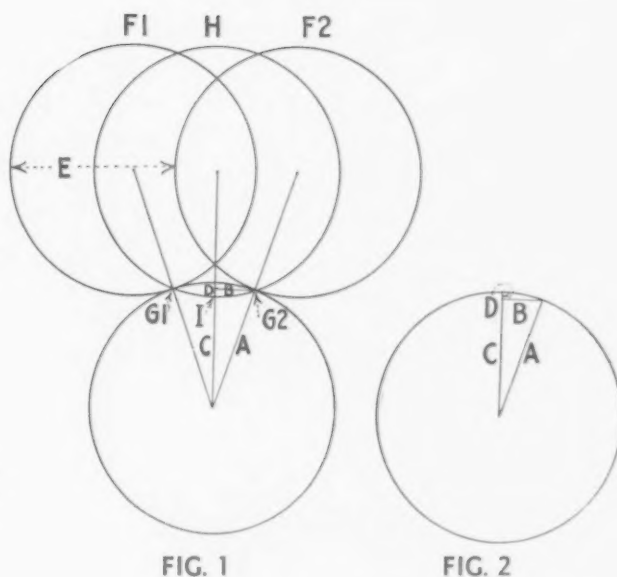
Fig. 1 shows the position of the two ends and middle of the straight (upper) roll in the topping process.

E = cross as measured with plumb line from the two ends of roll body ($F1$ and $F2$).

$G1$ and $G2$ = points of contact of the two ends of rolls.

H = middle of straight roll.

I = point of contact of middle of straight roll.



It will be seen that the point of contact in the middle of the two rolls is at twice the depth of the point of contact at ends of rolls [assuming upper and lower rolls equal in diameter. Editor.] Therefore the straight roll at point of contact is a surface crowned to the extent of one-half the concavity obtained by a given roll cross.

As B (Figs. 1 and 2) is one-fourth of roll cross (E), concavity must be figured to find depth of D , and then multiplied by 2 in order to give the total depth of concavity.

In measuring roll crosses in a lathe with a plumb line it is impossible to reach the extreme ends of rolls at one side, as the crossed upper roll shortens the distance to be measured.

With a pair of rolls of standard size and average concavity this means approximately $1/32$ in. in roll crossing measurement. As it takes about $3/64$ in. cross to change roll concavity one-thousandth of an inch, we are not considering this item in the following formula.

When rolls are crossed in the lathe, the following formula will give radius concavity in the hollow roll, presuming that one perfectly straight roll is used. Where rolls are of different diameters, use average diameter (One roll $27\frac{3}{4}$ in. and the other $28\frac{1}{4}$ in. will, with the same cross, deliver practically the same concavity as two rolls of 28 in. diameter).

Square A (roll radius).

Square B ($1/4$ of roll cross).

Subtract squared B from squared A .

Extract square root of remainder = C .

Subtract C from A = D .

Multiply D by 2. Answer is radius concavity of hollow roll.

Example of converting cross in inches to radius concavity in thousandths.

Roll radius 14 in., squared = 196 sq. in.
 Roll diameter 28 in. Cross $2\frac{1}{2}$ in. = 2.50 in.
 Roll cross $2.50 \text{ in.} \div 4 = 0.625 \text{ in.}$, squared = 0.390625 sq. in.
 $196 - 0.390625 = 195.609375$.
 Square root of 195.609375 = 13.98604 (in.).
 $14 - 13.98604 = 0.01396 \text{ (in.)}$.
 $0.01396 \times 2 = 0.02792$ or 0.028 (in.) roll radius concavity.

When radius concavity is a known quantity, the following formula will give the necessary cross.

Divide radius concavity by 2 = D .
 Subtract D from A (radius) = C .
 Square C .

Square A .

Subtract squared C from squared A .
 Extract square root of remainder, = B .
 Multiply B by 4 = roll cross necessary.

Example of converting radius concavity in thousandths to cross in inches.

Roll diameter 28 in. Radius concavity 0.030 in.
 $0.030 \div 2 = 0.015$.

Roll radius $14 - 0.015 = 13.985 \text{ (in.)}$.
 $13.985 \text{ squared} = 195.580225$.
 Roll radius 14 squared = 196.
 $196 - 195.580225 = 0.419775$.
 Square root of 0.419775 = 0.6479.
 $0.6479 \times 4 = 2.5916$, or $2 \frac{19}{32}$ in., scant.

Overheating in Carbon Steels as Influenced by Form of Cementite

THE sensitiveness of carbon steels to overheating and embrittlement as related to the type of cementite present has been investigated by S. Steinberg (*Stahl und Eisen*, Aug. 14, 1930). When steel is heated above A_c , the solution of cementite in gamma iron is slower, the coarser the cementite grain. Cementite grains dispersed in the solid solution retard the development of austenite grains, and therefore favor the formation of fine-grained martensite on quenching. The cementite grains act as crystallization nuclei for alpha iron on quenching, thereby opposing undercooling of austenite as well as martensite formation. Thus they raise the critical cooling rate and make the steel less sensitive to hardening. There is smaller tendency toward hardness cracks with granular cementite than with lamellar cementite. Inclusions and other particles, which do not dissolve in the solid solution, also influence the tendency toward overheating and the hardening.

Various heat treatments were applied to $3/5$ -in. square rods of the following steels:

	Carbon Per Cent	Silicon Per Cent	Manganese Per Cent
(a)	0.8	0.16	0.38
(b)	1.33	0.17	0.46

Granular cementite was obtained by heating at 1740 deg. F., followed by cooling in a 660-deg. lead bath, and holding at 1250 to 1290 deg. for 3 to 20 hr. lamellar cementite was obtained on slow cooling from 1740 deg. Hardening was accomplished by heating in salt baths and quenching in water. The brittleness of the hardened specimens was observed by fracturing them with a hammer.

Steel (b) developed hardness cracks on quenching from 1560 deg. in the lamellar cementitic condition, but this effect disappeared with the troostitic structure [after treatment in lead bath (treatment 2)], and with the granular cementite [(3) preceding treatment followed by 3-hr. heating at 1250 to 1290 deg.]. The lamellar cementite gave rise to coarse-grained fractures after quenching from 1380, 1470, and 1560 deg.; the fine structure consisted of mar-

tensite in a cementite network; and all tests were very brittle.

After treatments (2) and (3), specimens quenched from 1470 and 1560 deg. showed porcelain-like fractures at the edges but granular at the center. The fine structure consisted of almost structureless martensite with granular cementite at the edges, with troostite and cementite at the middle. The specimens were tough and very tough respectively. In hyper-eutectoid steels the effect of the treatment (2) may be explained as doing away with the cementite network.

Steel (a) after the lamellarizing treatment showed hardness cracks and poor fractures after quenching from 1355, 1380, and 1470 deg.; the fine structure was martensitic except that the test quenched from 1355 deg. showed troostite at the center. After treatment (2), quenching from 1355 deg. produced no cracks, and after treatment (3), no cracks were detected after quenching from 1355 and 1380 deg. After 10 hr. treatment at 1250 to 1290 deg. the same steel could be quenched from 1420 deg. without cracking. The troostitic and granular cementitic steels on quenching gave porcelain-like fractures grading to granular at the center. They were described as tough or exceedingly tough.

Wire and Wire Products

A BUYER'S guide fills the greater portion of the Yearbook of the Wire Association, of which the fourth edition has now been issued. The book is of 196 pages, consisting of a classified index of manufacturers in the United States covering almost three-quarters of the pages, followed by a foreign section, giving the principal units of the wire industry of Canada, Great Britain and the Continent of Europe, as well as plants in South America, Australia, China, Japan, India and Mexico. Several pages are devoted to a survey of the wire industry of the United States, based upon 1929 census figures.



Photograph by John P. Mudd for the Midvale Co.



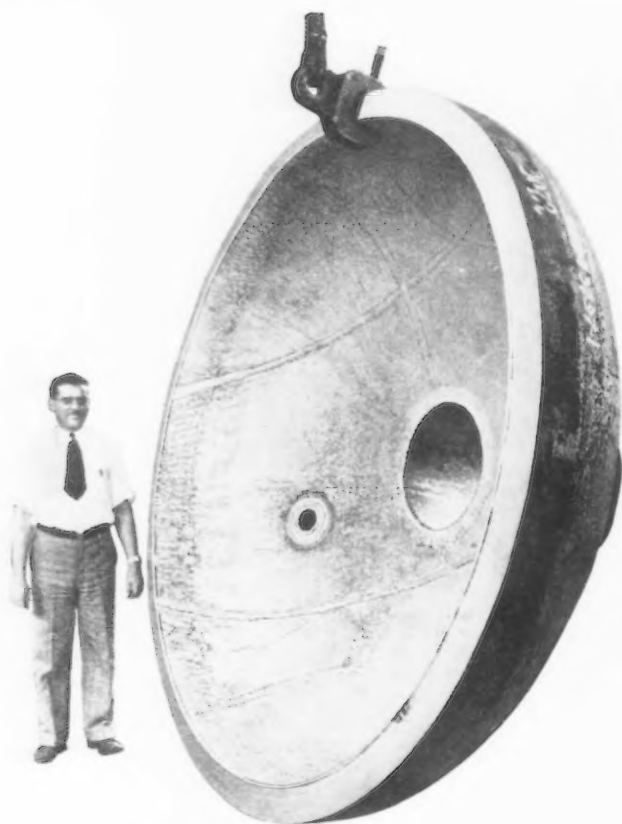
THE Iron Horse that takes industry's products to market. In spite of the inroads of motor trucks and barges, your steam puffing steed is still the chief connecting link between the makers and the consumers of our manufactured products. The clang of your locomotive bell is as much a part of industry as the thud of the steam hammer or the song of the cutting tool.



MAKING PRESSURE

By O. E. ANDRUS

Research Engineer,
A. O. Smith Corp., Milwaukee



No. 12-gage chrome-nickel iron sheets are used to line shells and heads which have wall thicknesses ranging from 3 in. to 5½ in.

WHEN large pressure vessels are used in certain oil refining and chemical operations, there is large loss of life from corrosion of the inside of such vessels, with results that are often costly and sometimes dangerous. The A. O. Smith Corp. has developed an alloy steel lining for such vessels which is claimed to overcome the disadvantages of the unlined vessel.

This article discusses the character of the lining and particularly the bonding method which makes the alloy lining practically an integral part of the vessel. Design of the vessel to prevent appreciable stresses in the carbon steel walls under service conditions is also covered. Five methods heretofore adopted to combat corrosion are gone into.

A PRACTICAL method of lining of entire pressure vessels with a corrosion-proof alloy has been developed by the A. O. Smith Corp., Milwaukee. This construction employs sheet alloy, which is bonded to the carbon steel so as to make the lining an integral part of the vessel wall, including heads, manways, nozzles, etc. The alloy lining is usually about No. 12 gage. After considerable large-scale development, production work was started and, by the end of 1930, three large "SMITHLined" cracking stills were in high-pressure, high-temperature operation. These vessels range in wall thickness from 3 in. to 5½ in., and each is lined with 12-gage chrome-nickel steel of the 18-8 type. A shearing strength of 8000 to 15,000 lb. is developed in the bond joining the sheet alloy to the carbon steel.

The first requirement of a lining is ability to remain attached to the vessel. This quality has been lacking in some previous attempts because proper heat transfer between the steel walls and the lining was not established, allowing large temperature differences to prevail with resulting destructive stresses. Unless the difference between the temperatures of the lining and the adjacent portion of the shell is kept sufficiently low during periods of temperature change in the vessel, rupture is certain to result. The success of the lining developed by the Smith company lies in

the bonding method, which makes the sheet alloy practically an integral part of the vessel, insuring the maintenance of small temperature differences throughout. This close bonding also assures the ability of the lining to transfer processing heat, which in some services is decidedly necessary.

The lined vessel is so designed as to prevent appreciable stresses in the carbon steel walls under service conditions. Calculations, based on the physical properties of the material at elevated temperatures, indicate that the stresses produced by a 7/64-in. chrome-nickel (18-8) liner in a vessel with a 2-in. thick carbon steel wall are below 1200 lb. per sq. in. under the most adverse conditions found in oil refining practice. The 18 per cent chrome steels will introduce even lower stress in the carbon steel wall.

Wall Thickness Remains Constant

It is also to be remembered that the wall thickness of a corrosion-proof lined vessel remains constant, while an ordinary carbon steel vessel gradually becomes thinner as the steel corrodes away. Thus, in the carbon steel vessel the stresses will be ever increasing and in time are likely greatly to exceed the comparatively small stresses in the 18-8 lined structure. As a matter of fact, the strength of a lined vessel is greater than that of the unlined, both vessels having carbon steel walls of equal thickness.

The particular alloy to be used in each case for the lining of a pressure vessel will depend entirely on the service it is required to meet. So far, chrome and chrome-nickel alloy steels have been tried mostly but the application is not limited to this group.

Several years have been devoted to the study of corrosion problems encountered in the refining and cracking of oil. For that length of time certain parts of SMITHWelded oil stills have been protected with alloys containing 18 per cent chrome or with the 18 per cent chrome and 8 per cent nickel combination. Both materials have proved entirely satisfactory and thus far have shown no visible signs of physical or chemical deterioration under the service mentioned. This substantiates laboratory tests, which indicate that a 7/64-in. lining should outlast six or more inches of steel.

Application in the Oil Refinery

It is obvious that any new developments must be considered not only from the technical viewpoint, but also in the light of economics. A study of all factors affecting costs, length of life, etc., is therefore of great importance. In the case of a lined vessel, the oil refiner must balance at least the following four factors against the added cost of lining:

1. Cost of replacement and repairs (material, direct and indirect labor).

VESSELS CORROSION-PROOF WITH ALLOY STEEL LINING

2. Shutdown costs for such replacements and repairs (overhead expenses and lost production profits).
3. Loss in process efficiency due to decreasing wall thickness (drop in conversion yields, throughput and flexibility).
4. Hazard costs incidental to corroding equipment (insurance, morale and efficiency losses).

If the refiner is already attempting to protect his vessels in some way, he must add to the above items the cost of the protective installations and the repair or renewal expenses in that connection.

Heretofore, a number of different methods have been used to combat corrosion and others have been proposed for the same purpose. Such methods can be classed roughly in five different groups as follows:

- 1.—*Reduction of operating pressures to compensate for corrosion.* This results in appreciable losses in throughput, conversion yields and flexibility in choice of oils. The element of hazard is considerable where corrosion is severe, particularly when reliance is placed on too few inspection measurements.
- 2.—*Increase of initial wall thickness to compensate for corrosion.* This results in high costs (steel is an expensive material when used to satisfy very corrosive oils). When non-uniform corrosion is allowed to

take place over considerable depths, a bad condition of uneven working stresses may result. It is no longer good policy to equip refineries with vessels which are limited to good charging stocks, since market and transportation changes may necessitate the use of medium or bad charging stocks.

3.—*Non-metallic liners.* Although not 100 per cent satisfactory, these have become popular because of their superiority over previous methods. However, the installation, repair and renewal costs mount to a large total over a period of years. The life is short and erratic, necessitating shutdowns. The uncertainty of bond produces non-uniform corrosion which is somewhat difficult to detect accurately. Since a vessel is only as strong as its weakest point, pressure drops with resulting losses in yield, throughput and flexibility must result. The coatings are quite susceptible to injury. Their heat-insulating effect makes cleaning, inspection and recabling jobs longer, more expensive and quite disagreeable. Although this method of protection possesses shortcomings along with a high cost, it deserves credit as having been one of the most satisfactory and economical solutions to date.

4.—*Addition of lime or caustic.* This method is fairly effective in the furnace tubes and chambers, but not entirely so beyond the distillation point. Since quantities considerably in excess of theoretical are necessary, the cost is high, difficulties are often appreciable, and the removal of slow-settling

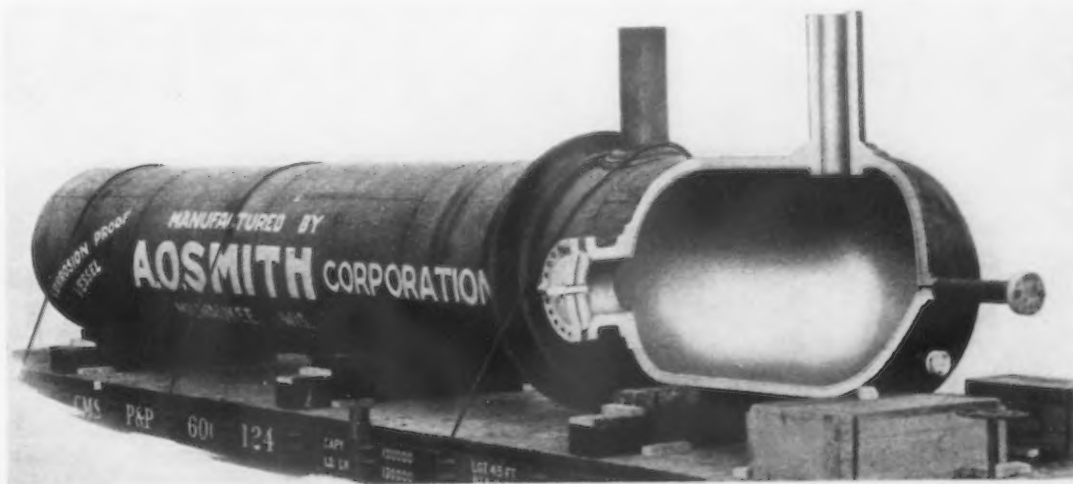
suspensions from fuel oils is expensive and troublesome.

5.—*Remaining methods.* These include thin coatings of metal as chrome plating and metal spray, or coatings in the category of paints. In general, they are too thin, being subject to porosity and mechanical injury.

The alloy sheet-lined vessel was developed with the aim of obtaining an economic solution to the corrosion problem, at the same time eliminating the various weaknesses inherent in past practices. The main objects of the development can be listed as follows:

- 1.—Freeing the refiner of the ever-present fear of serious pressure vessel fires and explosions, with accompanying loss of life and property.
- 2.—Providing a completely adequate vessel for long service rather than one which must be revamped at the very start and from time to time thereafter.
- 3.—Elimination of "pressure dropping" practices, with accompanying drops in conversion yield, throughput and charging stock flexibility.
- 4.—Maximum reduction in length of shutdown periods.
- 5.—A coating which will stand all the abuses given the unlined vessel without danger of removal of protection through spalling or undercutting.
- 6.—A vessel possessing a constant known strength, rather than a varying strength difficult to as-

Corrosion-proof alloy sheets are successfully bonded to carbon steel vessel walls, heads, manways and nozzles.



certain without further weakening the vessel with inspection scars.

7.—A coating which will not heat-insulate all or part of a vessel, thereby causing appreciable stresses during heating and cooling periods, and causing slowness of cooling during cleaning periods, with resulting time loss and discomfort.

8.—A method of protection which causes no obstructions to flow and which does not result in contamination of by-products.

9.—A vessel which is easily inspected at any time without necessitating the removal of protective coatings.

10.—Possibility of maximum market advantage through ability to use the most corrosive stocks with safety and profit.

Application in Chemical Industries

There are numerous possibilities for the lined construction in the vari-

ous chemical industries. It may serve as a structure to eliminate staining or contamination of products, to insure safety against the ravages of corrosion, to serve as a hydrogen-retaining seal, to substitute for a less reliable alloy construction having questionable physical properties, or to gain economic advantage over thick-walled alloy structures.

Since there is no one material which is a cureall for all corrosive mediums, it becomes necessary to make tests to determine the correct material. Although the laboratory may be able to predict the resistance to corrosive mediums, it is always desirable, if not necessary, to make immersion tests of lined specimens directly in the manufacturing retorts, digesters, stills, tank cars, etc. This method of testing is the one and only way of insuring that all factors are taken into account in proportion to their importance.

New All-Steel Railroad Sidewalk Crossing

An all-steel safety crossing for pedestrians has been developed by Joseph T. Ryerson & Son, Inc., Chicago. The design was made after a comprehensive survey of accidents and their causes, which showed that a majority of accidents are the result of pedestrians tripping over a defective intersection. Injuries of a serious nature have developed from pedestrians catching their heels in a knot-hole or crack.

To eliminate such hazards, the crossing is constructed of heavy diamond-pattern, rolled-steel plates, assuring a level, unobstructed walking surface of sturdy construction, practically eliminating maintenance expenses. The crossing is flanged under the ball of the rails so that there is not sufficient space for even a small child to wedge its foot, and danger of slipping has been guarded against by the diamond-pattern surface.

Corrosion has been greatly reduced by coating the underside of the crossing with tar, asphalt or red lead. The crossing is made in three units, a center and two outer sections. The center section is placed between the rails with the flanged ends fitting snugly under the ball of the rails on either side. The two outer sections are also flanged under the ball of the rails. When placed in position the three sections form a span that is level with the rails and the sidewalk. Channels and Zees in the under part of the crossing rest directly on the ties, assuring a level walking surface at all parts of the crossing.

Ends of the sections are formed downward, so that when the crossing is installed the ends serve to hold the entire crossing in place when spiked firmly to the ties. The ends being sloped to the ties and fastened securely, dragging brake beams and

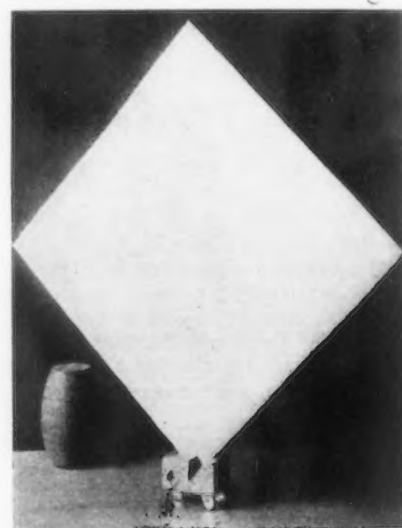
dangling chains from moving trains cannot catch and cause derailments.

The crossing is claimed to reduce the cost of rail repairs at sidewalk intersections because of the ease with which it may be installed or removed, less than 30 min. being required, even by inexperienced workers, to install or remove the three sections.

Roller Carrier for Sheet Metal

By A. KENDALL

We often have occasion to carry odd sheets of metal in parts of the warehouse that do not afford sufficient space to use a truck for the purpose. Previously we used to

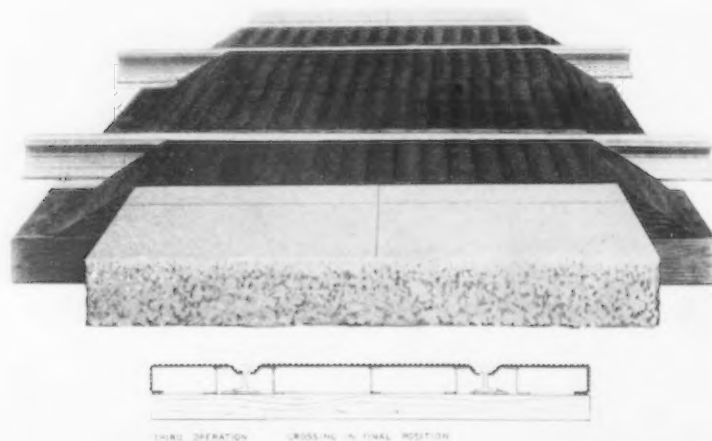


Ball bearings feature this 11-roll leveling machine, being applied to the 22 roll necks and to the counterweight levers.

do this by the simple method of carrying the bulky metal in the hands. But this was awkward, and if the distance was far it was laborious and necessitated several rests.

One of the men whose duty it was to carry these sheets devised a roller carrier for the job, and it has been well worth the few cents it costs to make. The device consists of a piece of hardwood 3 x 3 x 6 in. mounted on casters. The sheet metal is held cornerwise in a Vee cut out of the wood.

This Vee is made by first sawing a 45-deg. cut across the block, then a vertical cut into it and removing the piece. A 45-deg. saw cut is then made in the center lengthwise, so that it forms a right angle with the first cut and holds the sheet sideways. The illustration shows a sheet metal piece in the roller. The user, grasping the sheet with one hand, can push it along and guide it around corners or obstacles without effort.



ELECTRICAL HEATING OF INGOT TOPS TO INSURE SOUNDER STEEL

EXPERIENCE of a number of German plants in the application of electric heating to ingot tops for reducing the size of the pipe has been reported by E. Letixerant (*Stahl und Eisen*, Dec. 25, 1930). The electric arc provides practical heating without the pre-heating required with gas.

The apparatus consists essentially of an electric furnace, of which the molten steel in the mold constitutes the bath, the refractory hot top the furnace walls, while a movable hood serves as the roof. The electrodes with their regulators are suspended from a frame mounted on the hood, as shown in the illustration. Polyphase current is conveniently supplied through asbestos-covered cables from a switch board and transformer located near the pouring platform. In one installation, 5000 volts was supplied to a 100 kva. transformer. The electrodes were either automatic or manually operated. Carbon electrodes, varying in size from 3½ in. to 6 in. and 4 to 5 ft. in length, were used, according to the size of the ingot. At one plant two sizes of hoods were used in heating octagonal ingots weighing from 20 to 50 tons.

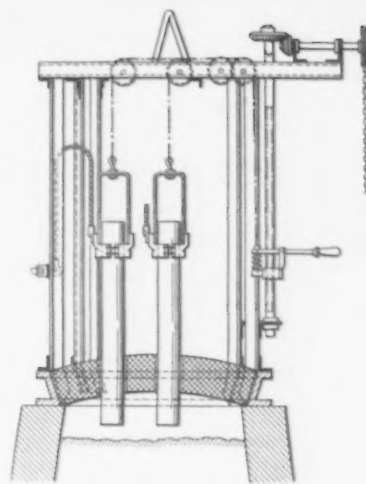
As soon as an ingot is poured, a few shovels of broken window glass are thrown on top of the metal in the mold. The heating hood is immediately placed in position by a crane and the current is applied. The glass forms a pasty slag which cuts down the radiation and also gives better regulation of the arc. Connection of the base of the ingot mold to the neutral point of the transformer permits better control of the arcs.

The results vary widely according to the size of the ingot and the kind of steel. With heavy ingots for forging, which are poured in molds with large refractory caps, the steel sank 12 to 16 in. uniformly over the cross-section, reducing the top waste from 30 to 40 per cent. If a refractory top is not used, a rim of metal is apt to freeze as the middle settles. On small ingots (6-ton) there was no apparent improvement. Electric heating also seemed to cause difficulty in removing the molds, where the practice was to remove the ingot at about 1470 deg. F.

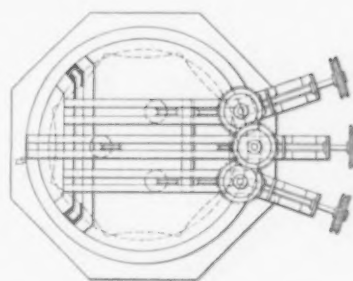
A comparison of results at different plants is shown in the following table:

Plant	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
Tons per ingot	23 to 46	25 to 100	15.0	20 to 30	17 to 77	19 to 45
Minutes heating	12 to 9	12 to 6	...	14 to 10	12.5 to 10.5	13 to 12
Power in kwhr.	20 to 15	...	...	13 to 10	16 to 13	18 to 16
Electrode consumption, lb. per ton	2.3 to 1.7	2.2 to 1.7	1.3	1.1	2.9 to 1.1	...

On the average, the time required for heating was: 20 tons, 4 hr.; 50 tons, 8 hr., and 100 tons, 12 to 13 hr. The average power consumption was: 20 tons, 350



DETAILS of the apparatus used for applying electrodes to heating the tops of ingots.



kwhr.; 50 tons, 800 kwhr., and 100 tons, 1400 kwhr. In general, the density of the upper parts of the ingots was increased. Sulphur prints showed that the steel in the top of a 19-ton ingot was almost free from segregation.

Strength of Gray Iron at Elevated Temperatures

DISCUSSING the "Strength of Gray Cast Iron at Elevated Temperatures," before the West of Scotland Iron and Steel Institute, Dr. J. W. Donaldson offered the following conclusions:

The strength of gray cast iron "as cast," at temperatures between 15 deg. and 600 deg. C., first decreases slightly to a minimum, then rises to a maximum before falling off rapidly.

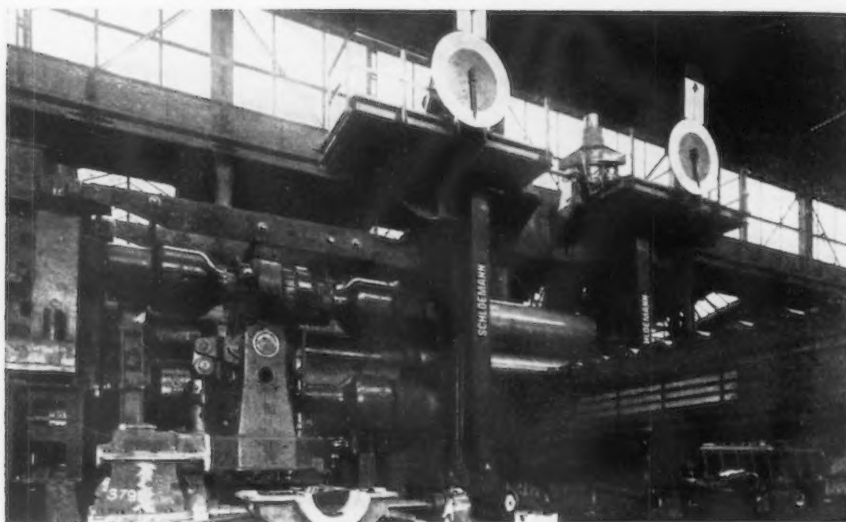
The minimum and maximum temperatures and the magnitude of the resulting depression in the temperature-stress curve are influenced by the silicon content of the iron and additions of such elements as chromium, tungsten, manganese, nickel and vanadium.

Heat treatment for a short period (4 hr.) at a low temperature (300 deg. C.) eliminates the depression in the temperature-stress curve. Such treatment also slightly improves the strength values, due to the releasing of casting stresses.

Heat treatment at 450 deg. or 550 deg. C. for 200 hr. reduces the strength values and gives rise to temperature-stress curves which fall off uniformly and regularly.

Temperature-stress curves obtained after heat treatment are of a similar nature and value to tensile-temperature-time curves derived from "creep" tests.

Iron with a low silicon content or containing small additions of chromium (0.4 per cent) or tungsten (0.5 per cent) has a high strength value at elevated temperatures. High silicon content or a small nickel addition (0.75 per cent) lowers the strength considerably.



German Aluminum Rolling Mill Installed in United States

A LARGE rolling mill for the production of aluminum and aluminum-alloy sheets has been shipped to the United States by the Schloemann A. G., Düsseldorf, Germany. The equipment supplied to the American buyer includes three mills for hot rolling and two for cold rolling sheets and a 44-in. three-high slabbing mill, which will take ingots up to 144 in. long. The mill, which is said to be one of the heaviest ever constructed for rolling aluminum, will roll from the ingot to the finished sheet. It is driven by two motors of 3000 hp. each. Certain parts embodying new features

in such a mill are patented by the Schloemann A. G.

Aluminum ingots are carried into the mill by electrically-driven rollers. Similar mills have been installed in Germany and Switzerland, but are smaller in size, this installation exceeding 1000 tons in weight. The builder of the mill claims that its production speed is greater and costs are considerably lower than in other aluminum rolling mills. In addition, only a few operators are required for continuous production of aluminum sheets.

as bakelite and special alloy steels are used extensively for parts in contact with flue gas. The machine is inclosed in a dust-proof cast aluminum casing, and is not affected by heat, moisture or shock. It is available for wall or panel mounting.

The standard 9-in. scale and circular chart 8 in. in diameter are graduated from 0 to 20 per cent CO_2 , and accuracy within 0.3 per cent CO_2 is guaranteed. Scales from 0 to 30 per cent CO_2 for blast furnace gas and 0 to 40 per cent CO_2 for lime kilns are available also. The recording mechanism is driven interchangeably by a spring clock or an electric clock, as desired.

Ranarex specific gravity recorders, with circular chart and of substantially the same construction as the CO_2 recorders described above, have been developed. The standard scale range extends from 0.2 to 1.0 (air = 1), but special ranges can be supplied upon request.

A special Ranarex recorder for the control of butane-air mixing has been developed. This machine has a specific gravity range from 1.0 to 1.2, with a superimposed adjustable scale graduated in B.t.u. per cu. ft.

▲ ▲ ▲

The Steel Founders' Society of America, Graybar Building, New York, which recently established an engineering department in charge of an experienced metallurgical engineer, is now offering a free consulting service to mechanical engineers, designers and others engaged in the selection and application of metals.

▲ ▲ ▲

New CO_2 Indicator and Recorder

A NEW model of the Ranarex CO_2 indicator and recorder has been placed on the market by the Permutit Co., 440 Fourth Avenue, New York. The Ranarex principle, based on specific gravity, has been retained, but the design has been simplified, and the machine made more compact and rugged.

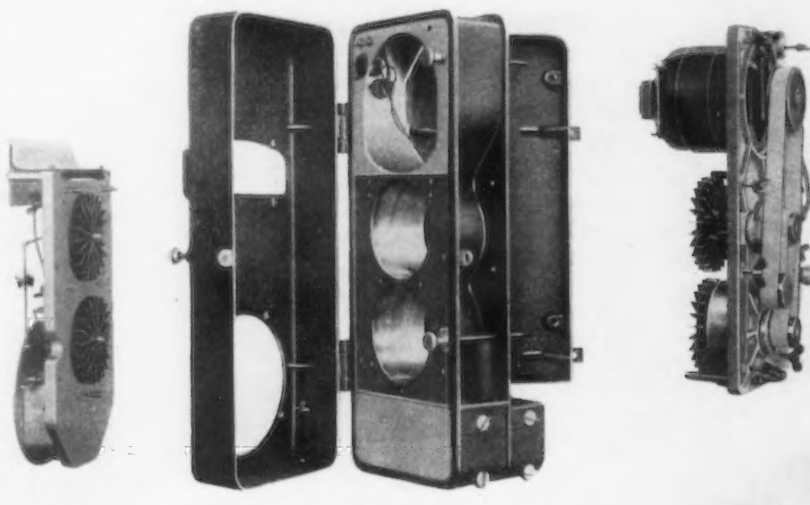
Working parts are accessible. The entire indicating and recording mechanism is attached to one plate, and the driving mechanism, including the motor, to another. Both plates may be removed, without the use of tools, by loosening a few wing screws. Their removal opens all gas passages over their entire length. Connection between the humidifier compartments and the measuring chambers is established by channels of ample cross-section.

In most instances the time lag will be less than a minute. This is of great importance to the plant engineer and his assistants, as it enables them to correct firing conditions just as soon as a change is needed. Hence

the proper percentage of CO_2 can be maintained at all times.

Corrosion-resistant materials such

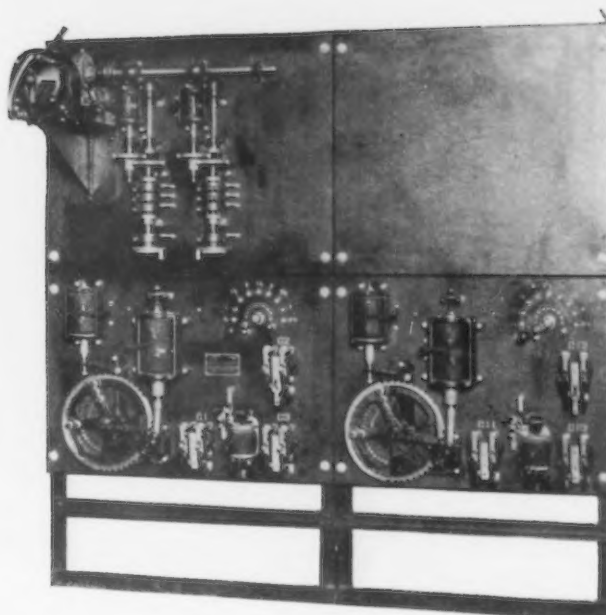
Interlake Iron Corp. has sold \$5,000,000 first mortgage 5 per cent gold bonds to a banking syndicate, the proceeds of which will be used to reimburse the company in part for acquisition of additional properties and for other corporate purposes.



Ranarex CO_2 indicator and recorder opened for inspection. Left, plate with indicating and recording mechanism; center, dustproof aluminum casing; right, plate with driving mechanism.

AUTOMATIC TIMING FOR HEAT TREATING

By P. B. HARWOOD, E.E.
CUTLER-HAMMER, INC., Milwaukee



THE necessity for timing various steps of a process often arises in industry, and sometimes the necessity for very accurate timing of these steps and also the possibility of variations in the timing in very fine degree will justify the use of a relatively expensive timing device.

The device shown in the photograph was designed for timing the parts of a heat-treating process. The process was divided into three parts, and it was necessary to time each of these parts in sequence automatically. The time had to be adjustable in intervals of 1 sec., from 1 sec. to 5 min. for each part of the process. At the time when the photograph was taken only two of the timing devices were installed. The blank panel at the upper right will be occupied by a panel duplicating that immediately below it and an additional cylinder will be added to the upper left-hand panel.

A small synchronous motor was used to drive a shaft through a gear reduction. From this main shaft which ran continuously at a constant speed, smaller shafts were driven at right angles through bevel gearing. A timing cylinder was arranged so that it could be connected to the small shaft by means of a clutch. When connected to the small shaft the timing cylinder made one revolution in 30 sec. The clutch consisted of a gear which was engaged by means of a solenoid and disengaged by gravity. The timing cylinder had several sets of contacts used for functional purposes and in particular one set which made a contact at the end of each revolution. This set of contacts was used to energize the coil of a ratchet-operated pilot switch. This pilot switch, therefore, moved one notch for each revolution of the timing cylinder, or in other words, one notch for each 1/2 min. The ratchet-operated switch closed a different pair of contacts on each position and by means of a man-

ually operated selector switch it was possible to choose the desired set of contacts or, in other words, to choose the number of half-minutes required. In addition to the contacts which operated the ratchet switch the timing cylinder had an adjustable pair of contacts which could be set to close a circuit in any number of seconds from one to 30 after the timing cylinder had started to move. This pair of contacts was connected in series with the contacts of the ratchet switch so that, in order to obtain a circuit for the signaling device, it was necessary for the ratchet switch to be in the proper position according to the number of half-minutes selected and for the timing cylinder to be in the proper position according to the number of additional seconds selected. A small lever may be seen at the bottom of the timing cylinder. This was used for selecting the number of seconds required.

When the two pieces of apparatus had both reached the desired positions, in other words, when the selected length of time had elapsed, a circuit was made for a timing relay which closed immediately and operated the signal, which might be a light or an alarm bell. The pilot device and the timing cylinder immediately returned to the "off" position, but the signal continued in operation for a length of time determined by the setting of the time relay. No particular accuracy, of course, was required for the duration of the signal.

At the same instant that the signal was energized the clutch for the second timing mechanism was also energized and that cylinder started to move, thus timing the second part of the process. When the second part had been completed in the same manner as above outlined for the first part, then the third timing cylinder was started. When the third part of

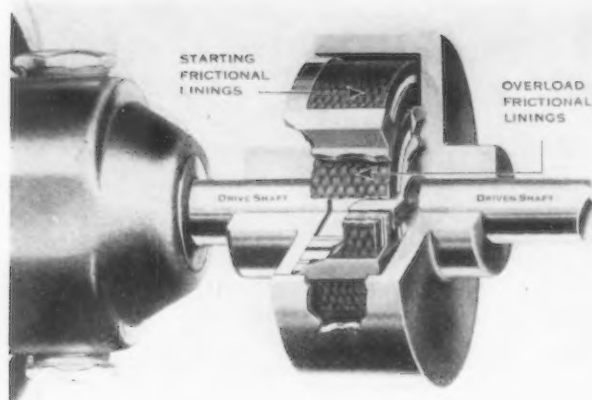
the process had been completed, the first cylinder was again energized.

From the above description it may be seen that, while the device described seems to be rather a large piece of apparatus for such a simple thing as timing, nevertheless it does accomplish some results which are rather difficult to obtain. It times a process accurately up to a total of 15 min. divisible into three parts in any desired ratio and each part adjustable in seconds up to 5 min. Furthermore, the time is maintained accurately because of the synchronous motor-driven main timing shaft. There are, doubtless, a number of processes in which such a device could be used and also it would be possible, of course, to use the device actually to initiate some action, such as starting a motor, instead of operating a signal.

Shipments of enameled sheet-metal ware in February totaled 289,205 doz., valued at \$1,044,682, against 267,232 doz., valued at \$985,756, in January, according to reports received by the Bureau of the Census from 15 manufacturers, representing approximately 80 per cent of the industry.

Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y., has appointed Elliott Electric Co., 2178 West Twenty-fifth Street, Cleveland, and A. G. Acker, Keystone Building, Pittsburgh, as representatives in those cities for Sprague electric hoists and winches.

Philip T. King, 50 Church Street, New York, dealer in cranes, has purchased the stock of crawler cranes and shovels of the Industrial Brown-hoist Corp., which is consolidating its Bay City, Mich., and Cleveland plants at the former location. The purchase amounts to about \$500,000.



▲ ▲ ▲
CENTRIFUGAL force actuates this automatic starter and flexible coupling. Gradual application of load is a feature.
 ▼ ▼ ▼

Flexible Coupling Reduces Starting Loads

TWO concentric sets of friction lining segments, weighted with lead reinforcement and floating between the driving and driven members, are expanded by centrifugal force during the operation of the Rawson automatic starter and flexible coupling brought out by the Washburn Shops of the Worcester Polytechnic Institute, Worcester, Mass. By allowing the driving motor to come up to speed before load is applied, the coupling is intended to reduce starting shocks and to permit the use of standard-wound motors, in many cases of smaller size than would be required by a more rigid shaft connection.

The outer friction lining is carried by the driving half of the coupling and is designed for a load capacity equal to the rating of the motor. The

inner friction ring, which provides overload capacity, is rotated by the driven shaft, and consequently does not come into action until after the driven shaft has begun to revolve. It is pointed out that these inner friction segments prevent overheating which might occur if reliance was placed on a single lining having only the rated load capacity. Furthermore, as the two sets of linings do not expand simultaneously, a gradual application of the load is assured.

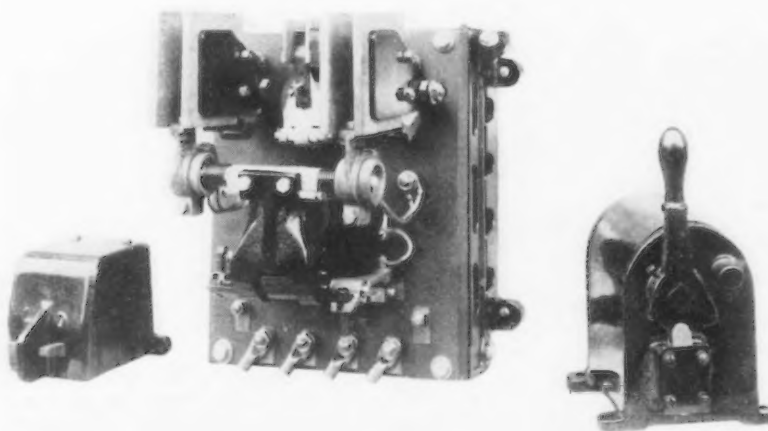
The pick-up interval may be fixed to suit operating conditions. The couplings will operate in either a horizontal or vertical position and in either direction of rotation. They are obtainable in a range of sizes for various loads, speeds and shaft diameters.

One-Unit Motor-Generator Set

A NEW one-unit motor-generator set for ratings of 1 to 5 kw. has been brought out by the Reliance Electric & Engineering Co., 1088 Ivanhoe Rd., Cleveland. In these sets the usual a.c. motor and d.c. generator are combined into a single unit,

requiring only two bearings—one at each end. The induction-motor rotor and direct-current armature are mounted on the same shaft.

This design provides a very rugged, compact construction, which requires less space than with the two-unit sets.

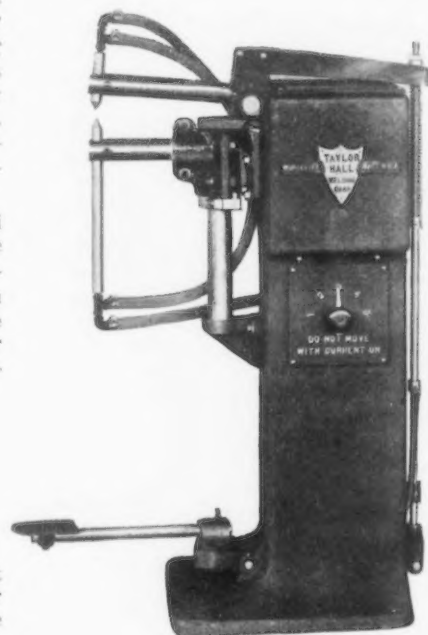


Because it is one unit, the work of connecting and alining individual units and attendant troubles are eliminated. The conduit outlets are large, to make wiring very easy.

These motor-generator sets can be furnished for operation on either two- or three-phase circuits of any standard voltage or frequency, and have an output rating of 1 to 5 kw. at 125 or 250 volts. They may be obtained with either sleeve or ball bearings.

New Spot Welder Has Adjustable Horns

THE spot welder, here illustrated, a new product of the Taylor-Hall Welding Corp., Worcester, Mass., is made in two models, the type illustrated having a lower horn which is adjustable through a vertical distance of 10 in. to a minimum of 2 3/4 in. between horns. This horn is of the



swinging type, facilitating the welding of deep boxes and similar work. The other model has straight horns which may be from 8 to 24 in. long, as desired.

Horns, dies and the lower horn swivel post are made of hard-rolled copper. The two-piece construction of the horn clamping blocks is intended to make adjustment easy and to provide positive clamping. Controls include an automatic switch and current regulator inclosed in the base, and an adjustable foot treadle which may be lengthened or moved to either side to suit the operator's convenience.

Both models are made in 7 1/2 and 12 kw. sizes, capable, respectively, of welding two pieces of flat steel 1/16 or 1/8 in. thick. Each model measures 18 x 36 x 50 in. high, overall. The largest size machine weighs 665 lb.

HOW BANKERS REGARD EQUIPMENT LOANS

IMPROVED machinery is the one means of securing larger profits from a smaller volume of business. It is the one means of obtaining the price reductions in product that are demanded by curtailed purchasing power. It is the one way to practice the economy demanded by the times by transforming wastes into profits."

An editorial, from which the above is quoted, appeared in *THE IRON AGE* of April 9. It expressed the belief that the sound and sensible way out of the present dilemma is through cost reduction rather than wage cutting. And that recent improvements in nearly all types of industrial equipment make it possible for industry to place itself now on a substantially higher efficiency plane by re-equipping with up-to-date machinery.

This editorial was sent to the leading bankers of America, for the purpose of obtaining their attitude toward equipment loans made for the purpose of cost reduction and not for volume expansion.

The answers, reproduced on the following pages, will be of interest to all makers and users of cost-saving machinery. They epitomize the bankers' attitude toward improved mechanization and reveal some of the obstacles which makers and users of improved equipment must overcome to secure replacement funds.

For obvious reasons the names of institutions and individuals are omitted.

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Cash Reserves Essential

CLEVELAND.—I believe that for a manufacturer to keep up-to-date he must continually keep his eyes open for new equipment that will keep his cost of production down rather than increase it.

Certainly all of these conditions as they arise depend on the financial set-up of the corporation, and unless they set up a cash reserve for depreciation of machinery, so that when they need new machinery they have the cash on hand with which to buy it, they will be in the position of having only figures on their books and no cash. That has been the trouble with a good many corporations in their set-ups, showing reserves and then when you look on the asset side of the ledger you don't find

any cash with which to replace the machinery.—Signed, Vice-Chairman.

♦ ♦ ♦

Capital Versus Short-Term Loans

NEW YORK.—In contemplating plant expansion or replacement, serious attention should be given to the question of the extent to which working capital will be affected by such a program. If this is done, it will probably appear desirable to finance such expansion or replacement through the introduction of permanent capital or long-time borrowing, rather than by means of short-time bank loans.

While various methods of controlling production have been and are being tried

By
JOHN H. VAN DEVENTER
Industrial Consultant
The Iron Age

out, I do not know of any definite policy on the part of the bankers of the country to promote such control through refusals to finance the purchases of new equipment for the purpose of reducing production costs.—Signed, President.

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Bankers Usually Will Cooperate

TRENTON, N. J.—As I am also in the manufacturing business, I am well aware of the necessity for the introduction of any labor-saving devices or new and improved machinery that it is possible for manufacturers to apply in their business.

I do not know of any bankers who have turned down any proposition of this kind. On the contrary, I think when a man shows his ability and foresight and has something that is desirable from a business standpoint, you will find that bankers as a general proposition are most helpful.—Signed, President.

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Actions Speak Louder, Etc.

DULUTH, MINN.—We cannot answer for other banks, but so far as this bank is concerned would say that we have made loans within the past six months of over \$500,000 for the express purpose of enabling manufacturers to install more efficient equipment.—Signed, President.

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Good Management Essential

GRAND RAPIDS, MICH.—So far as I know any industries desiring to equip themselves with new and efficient machinery are considered very carefully according to their needs. So far as our bank is concerned, we have not refused to advance money for such investments, where we felt that the management knew what it was doing.—Signed, President.

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Credit Rating Must Warrant Loan

COLUMBUS, OHIO.—We would have no hesitation in loaning a manufacturer money for the purchase of new machinery, provided his statement and credit rating warranted the loan irrespective of that situation.—Signed, President.

Delighted to Help Cut Costs

KANSAS CITY, MO.—In my opinion most bankers would be delighted to help their customers buy machinery that would speed up production and lower their cost. Even in the present complex economic situation, I think it is a good policy to produce commodities at the lowest possible net cost and with the least effort.

Our problem is more to find new outlets and new uses for our merchandise rather than to cut down production and to increase production cost by going back to or using antiquated methods.—Signed, President.

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Better Than Government Bonds

DETROIT.—I think the average banker would much rather see a reasonable proportion of corporate surplus invested in high-speed, low-cost production equipment than to have it placed in U. S. Government bonds at approximately 3 per cent, or put out in the call money market for less than one-half of that.—Signed, Vice-President.

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Modernized Methods

NEW YORK.—A recovery in business will come through modernized thinking and methods and they must include improved machinery and equipment.—Signed, President.

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Capital Versus Commercial Loans

NEW ORLEANS.—The question discussed borders very closely on the economic demarcation between capital loans and commercial loans.

Some large banks have in the past advertised very frankly that they did not handle capital loans in their commercial organizations, and one advertisement we remember quite clearly defined a capital loan as one, the proceeds of which were used for the purchase of new equipment.

As you know, capital loans are not liquid from a commercial standpoint, and while they may result in commercial improvement, this improvement is bound to be slow, and especially when the proceeds of these loans are used to replace obsolete, high-production-cost equipment.—Signed, President.

Sound Management and Credit

NEWARK, N. J.—No one knows better than I what well equipped machinery can do for the manufacturer and what poor equipment can do to him. The manufacturers who have built up a sound foundation for credit would have no trouble borrowing money from our institution for new equipment. However, there are so many cases where, even with good equipment, the management would prove fatal. The bankers have to discriminate.—Signed, President.

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Encouraging Cost Reduction

UTICA, N. Y.—If it is possible that manufacturers are seeking short-term bank credit for the purpose of purchasing new equipment, is it not quite possible that bankers' refusal to extend this type of credit for capital purposes is to avoid the danger of a capital loan, rather than because they fear the new equipment will increase capacity. Judging by our own experience and our discussions with other banks in this part of the State, we are encouraging as far as possible the reduction of costs in manufacturing, for the several reasons pointed out in your editorial.—Signed, President.

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Builders Must Do the Selling

NEW YORK.—We have plenty of money to loan to the manufacturing concerns with whom we have banking relationships; and if they have the proper financial basis for credit, we do not pretend to be the judges as to whether or not new equipment is something they need to purchase. Machinery builders themselves have the selling job to do, not the bankers.—Signed, Vice-President.

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Should Depend on Reserves

NEW YORK.—If a manufacturer is to stay in business, he must be able to compete, and this he cannot do unless he has the most up-to-date machinery. A manufacturer running his business properly, therefore, should have sufficient reserves set up to enable him to replace obsolete equipment and not depend upon loans from his banker.—Signed, President.

Exports Restrict Markets

BINGHAMTON, N. Y.—I subscribe heartily to the ideas contained in your editorial of April 9.

The only problem that the manufacturers of machinery bring us, as I see it, is that inevitably they are constantly cutting down the export market by reason of exporting machinery and sending expert trainers to teach new operators in foreign countries, from which we have received in the past large orders.

On the other hand, we probably are faced with the condition, if we do not manufacture and export this machinery to these countries, the machinery manufacturers of other countries will do so.—Signed, President.

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Money from Stockholders

ERIE, PA.—I do not believe a banker worthy of the name could confuse new or replaced equipment with increased capacity.

In my opinion, it is not the function of banks to advance money for permanent improvement, at least, not to any great extent, and you must readily see that equipment could hardly be expected to pay for itself in the comparatively short time for which bank loans of this character should be made. All banks are banks of deposit, and I believe that the deplorable failure of many banks has been due to their failure to keep liquid. If, however, the customer's credit is otherwise good and not over-extended, I think most banks look on the purchase of new machinery as a progressive step. At the same time they must expect their customers to properly depreciate old machinery, and to build proper reserves for replacement. Loans of this character are considered by good banks and by the Comptroller of the Currency as capital loans, that is, money which should be put in by the stockholders and not through bank borrowing.

It seems to me that a great deal of machinery and equipment is purchased today with the help of the large finance companies which are properly capitalized and organized for the purchase of this kind of paper, the payments upon which are usually arranged for over a period of months.—Signed, President.

Field for Investment Banker

NEW YORK.—We are in the business of loaning money and will do so where we think the proposition is a safe one. We believe that industrial leaders know their job better than we do, except from the standpoint of whether they can spend a large sum of money at a given time for equipment or any other purpose. Provided their financial structure seems to justify such a procedure, they can have their needs supplied by us at any time. Do not forget, however, that there is a definite field for the commercial banker and the investment banker. The latter deals with such cases as require long-term financing for capital purposes; such an investment banker must know that the public will buy the securities that he wishes to distribute. At the present time, I confess there is some difficulty, because of the attitude of the public, in readily disposing of long-term securities of anything but the highest class.—Signed, Vice-President.

Merits of Each Situation Decide

NEW YORK.—Such loans as we make in our own institution are based upon the merits of each situation as we see it, and we do not believe that any generalization on our part is called for. We do not feel warranted in either advising or interpreting the views of other banks in the matter, assuming that each institution handles such matters in accordance with its own business judgment.—Signed, Vice-President.

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Workman Must Have Good Tools

PORTLAND, ME.—I do not understand why any manufacturer whose standing entitles him to accommodation for purpose of replacing out-of-date machinery should not be accommodated.

It is unreasonable to expect a workman to succeed without the use of good tools and the same applies to operations on a larger scale.—Signed, President.

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SUMMARIZATION OF VIEWPOINTS

1—These bankers, almost without exception, agree upon the desirability of industry installing improved machinery as a means of working out of the present situation.

2—There is some conflict of opinion as to cost-saving equipment being a legitimate basis for commercial or short-term loans. Some bankers classify them as capital charges. (This seems to call for a reclassification in the case of equipment which will pay for itself in a year or less through cost savings.)

3—Many bankers believe that depreciation reserves are merely bookkeeping entries. They say that reserves should be in cash.

4—Regardless of the prospective cost-saving, the management desiring to borrow must be sound and its credit rating good.

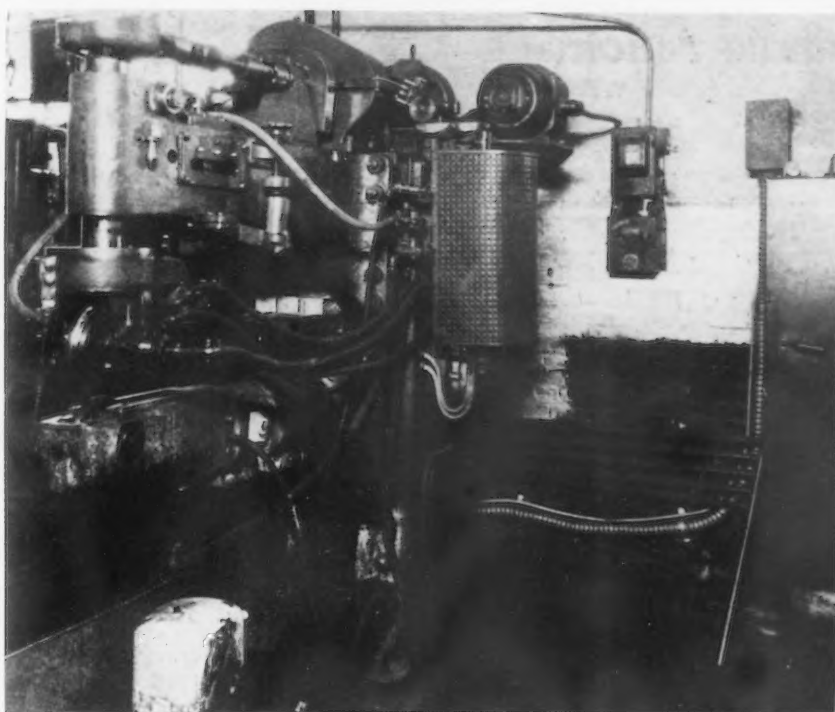
5—Several of these bankers believe that the investment banker and the finance company should function in the case of equipment loans, rather than the commercial banker.

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Copies of this insert may be secured from the Reader Service Department of The Iron Age, 239 West 39th Street, New York.

Previous recent editorials on the subject of replacement:

"Machinery Needs a Friend", The Iron Age, March 12, 1931.
"Depressions Uncover Obsolescence," The Iron Age, March 19, 1931.
"One Word Costs Billions," The Iron Age, April 9, 1931.
"How to Win This War," The Iron Age, April 16, 1931.



Thyratron Control Speeds Production Welding

INTERMITTENT line and spot welding with interruptions as high as 1000 a minute or more are possible with a new type of control equipment announced by the General Electric Co., Schenectady, N. Y. In this control "thyatron" tubes are used instead of contactors for interrupting the flow of current. In addition to the high speeds obtained, contactor wear is eliminated, both on the contactor tips and the entire mechanical assembly.

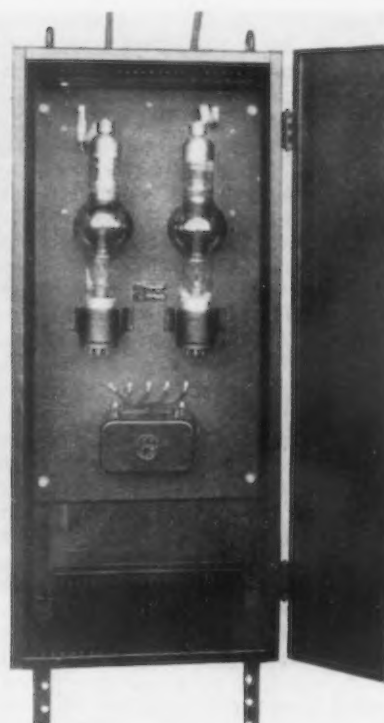
The theory of the new control is as follows: In series with the primary of the welding transformer proper is placed the primary of a series transformer whose secondary is wound for a high voltage. Connected to the high-voltage winding is a pair of thyratrons which, when conducting, virtually short-circuit the high-voltage winding. When the high-voltage winding is short-circuited, the impedance of the primary or low-voltage winding of the series transformer is very low, thus permitting approximately full load current to pass to the primary of the welding transformer proper. Conversely, when the thyratrons are not conducting the high-voltage winding of the series transformer is open circuited and the impedance of the low-voltage winding is at a maximum, thus permitting practically no current to flow in the welding transformer primary circuit.

Conduction or non-conduction of the thyratrons is controlled by imposing an "in-phase" or "out-of-phase" voltage on their grids; this is accomplished mechanically by the closing

or opening of a small single-pole switch. In an actual installation, on the intermittent line welding machine illustrated, the switch is operated by a cam which is driven by a variable-speed motor, the speed of which determines the number of welds per minute.

The new control consists of two essential parts: the series transformer and a control panel. The series transformer is ordinarily a standard distribution transformer and is mounted at a point conveniently near the control panel. On the control panel are mounted two hot-cathode thyratrons, the filament

THE Thyatron tubes, below, control the operation of the intermittent line welder at left. Interruptions as high as 1000 a minute are obtainable.



transformers, grid transformer, a time-delay relay, and the necessary resistors, capacitors, etc. The only equipment mounted on the front of the panel is the two thyratrons and the time-delay relay. The entire panel is inclosed in a sheet-metal case as illustrated.

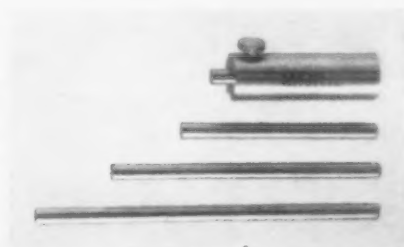
In operation, the line switch is first closed, whereupon the cathodes of the thyratrons heat up. After a time sufficient to allow the cathodes to heat, the time-delay relay closes the main contact and the unit is ready for operation in the conventional manner.

Small Depth Gage

FOR accurately checking the depth of holes, counterbores and distances between shoulders and flanges, the Brown & Sharpe Mfg. Co., Providence, R. I., has brought out a new depth gage designated as the No. 599. The tool can be used also for many other measurements which require a

small depth gage and can be applied against or between very small shoulders or in shallow recesses.

Depths from 0 to 2 in. by 0.001 in. are obtained by measuring the overall length of the body and rod with a micrometer. From this measurement is subtracted the length of the body, which is exactly 1 in. The rods are polished and the hardened and ground body has a V-groove to facilitate measuring against a curved surface. The setting can be securely locked by the clamp screw. If desired, the tool can be used to measure distances from 1 to 3 in. between shoulders, etc.; where the tool is so used the micrometer reading of the overall length of the tool is the correct dimension.



Develops Single-Spindle Automatic Bar Machine

THE New Britain-Gridley Machine Co., New Britain, Conn., is bringing out an automatic bar machine that in basic design follows the single-spindle work-revolving chucking machine introduced some three years ago. Parts comprising these machines are interchangeable and chucking machines of this design now in use may be converted into bar type, the extra parts necessary to make this change-over being obtainable from the makers. The capacity of the new machine is for bar work up to 5 in. in diameter.

The hollow spindle, bar feeding mechanism and adjustable bar stop are the principal new members of the bar machine. The bar feeding mechanism is contained in a separate housing bolted to the rear of the machine and operates both the pusher, which advances the stock, and the work-holding chuck. In addition to unusually heavy ball-bearing spindle construction, the machine features a unique collet locking mechanism. In this mechanism a large number of balls is employed to obtain the required pressure for locking, and the construction is such that not only is the locking positive and the locking pressure is perfectly balanced, but unusually long life is assured for the mechanism.

As in the case of the chucking machine, described at length in *THE IRON AGE* of Feb. 2, 1928, the tools are carried in arms that are mounted at the ends of sliding bars (tool slides), one bar on each side of and parallel with the spindle. If required, an overhead slide can be mounted above

the spindle, as shown in the illustration, for machining the bevel face on differential ring gears or for angular cuts on other work, or an overhead slide may be set perpendicular to the spindle axis if the nature of the work requires it. Furthermore, the two tool arms and the overhead slide may be arranged to work alternately or simultaneously and to function entirely automatically.

The tool-carrying bars at each side of the spindle are of large diameter and are carried in split adjustable bearings at the front and rear of the cabinet base. They have independent longitudinal and semi-rotative movement, and each slide is independent of the other, being actuated by cams mounted on separate camshafts. Both slow and fast longitudinal and semi-rotative movement of the tool-slides is provided for, the fast motion being for positioning the tools and the slow motion for feeding them. The fast and slow longitudinal movements are controlled automatically by cam-actuated clutches, while the rapid semi-rotative motion is through a face cam and segment gear arrangement. The maximum longitudinal movement is 4 in.

The machine is driven by a motor contained within the base. From the motor the drive is by chain and sprocket to the worm-shaft, which drives, in turn, the work spindle. The latter, through change gears, drives the camshafts when they are in slow motion. A variety of spindle speeds is obtainable through the use of upper sprockets of different diameters. Fast motion of each camshaft is ob-

tained from a small sprocket through the cam-actuated clutches previously mentioned.

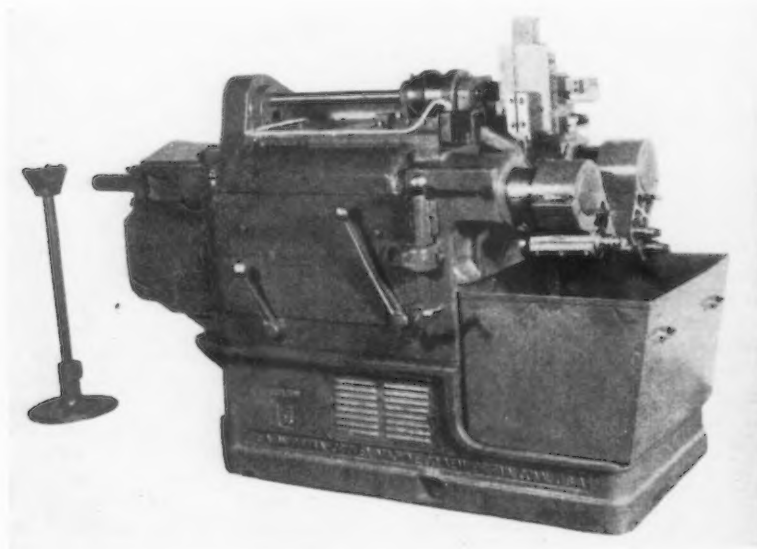
Rigid and heavy construction to assure accurate work is a feature of the machine. All major parts except the frame and tool-holders are of forgings or of bar stock, and unusually large preloaded ball bearings are used on all shafts, including the camshafts. Flood lubrication of all bearings is obtained by means of a pressure pump, and a motor-driven centrifugal pump of 70-gal. per min. capacity supplies ample lubricant to the cutting tools. The hydraulic unit that operates the chuck of the chucking machine is not necessary and is not included with the bar machine. In the chucking machine as now built, the hydraulic unit is contained within the machine itself, instead of being a separate mechanism, as heretofore.

Production rates on the bar machine are said to be limited only by the maximum allowable cutting speeds of the tools used. This machine occupies floor space of 36 x 84 in. and weighs 8300 lb.

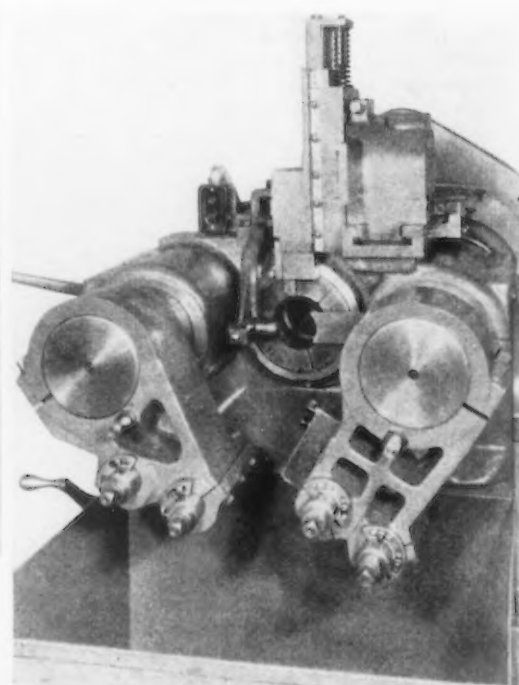
An Omission

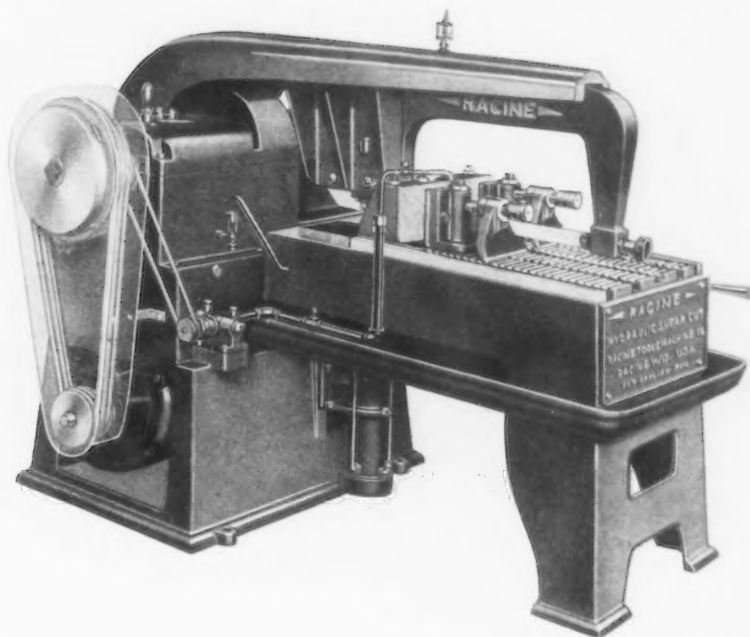
In the April 9 issue of *THE IRON AGE*, on page 1196, an illustration was presented of an interesting hoist installation. Through error this was not credited to the Hanna Engineering Works of Chicago, which was the builder of the equipment and supplied the photograph of the installation.

John A. Roebling's Sons Co., Durable Wire Rope Co. and New Jersey Wire Cloth Co. have removed their Boston office and warehouse to 51 Sleeper Street.



THE hollow spindle bar feeding mechanism and adjustable bar stop are the principal new members of this New Britain-Gridley automatic. The machine can be equipped with an overhead slide as shown.





Power Saw Speed Increased by Hydraulic Feed

HYDRAULIC operation of feed, lift, clutch, and rapid traverse, and complete control through a single lever at the front of the machine are features of a new series of power saws being introduced by the Racine Tool & Machine Co., Racine, Wis. These machines are made in 10 x 10-in., 12 x 12-in. and 10 x 16-in. capacities, the largest being suitable for structural steel work.

Reduction in the number of moving parts and more rapid cutting are important advantages of the hydraulic feed. Factory tests are said to show

the practicability of cutting through a 9-in. mild steel bar in 13 to 20 min., and, in general, a cutting rate up to 5 sq. in. a min., depending on the class of metal. The hydraulic feed enables the operator to cut through a 6-in. pipe with 1/2-in. walls in 1 1/2 min.

For developing the necessary hydraulic pressure, the "Racine Oil-motor"—a variable-displacement, constant-pressure pump—is employed. Hydraulic pressure carries the saw blade downward throughout the entire stroke and thus promotes rapid cutting. The amount of feed is con-

trolled by a graduated dial to be set by the operator according to the size of the stock. If the resistance to the saw blade exceeds the allowable pressure on the blade, however, the oil pump automatically reduces the feed momentarily. The action is obtained without cams, levers, springs or other mechanical mediums.

Quick traverse of the saw frame up and down, the feed during the cutting stroke, the lift on non-cutting stroke and the operation of the clutch are hydraulically operated, and are controlled by the single lever. An automatic hydraulic knockout is provided. At the finish of the cut the saw frame automatically opens a valve, releasing hydraulic pressure into the control valve, whereupon the control lever moves from feeding position to "raise." The clutch is disengaged and the saw frame rises to the "up" position.

The machine incorporates a three-speed geared head which provides cutting speeds of 55, 85 and 120 strokes a minute. The length of stroke is 6 in. The driving head is connected by V-belts to a 3-hp., 1200-r.p.m. motor.

The table casting extends the full length of the machine. It is fitted with replaceable plates, 1 1/2 in. thick, on which are mounted a double set of vise jaws providing means for holding the work on both sides of the blade. Fixtures for cutting stock at any angle up to 45 deg. can be furnished. Openings in the table permit chips to drop into a large pan below.

The top of the saw guide is fitted with two sets of gibs, each with a 24-in. bearing. At the bottom is an additional gib fitting into ways on an apron that is cast integral with the saw guide. This arrangement, in connection with the hollow sectional construction of the saw frame, is intended to provide unusual rigidity.

Cageless Tapered Roller Bearings

ABSENCE of a cage or retaining ring is the principal feature of the tapered roller bearing illustrated, a complete line of which has been placed on the market by the Tyson Roller Bearing Corp., Massillon, Ohio.

Positive roll alignment is attributed to the use of a double ribbed backplate at the large end of the rolls, which arrangement eliminates the need for a cage. The shoulder of each roll gets a bearing on the inner rib of the backplate and also on the outside rib, this double contact on the thrust end of each roll being emphasized as providing positive alignment both longitudinally and vertically. The pintles at both ends of the rolls, extending into annular grooves in the backplate and closing ring, hold the

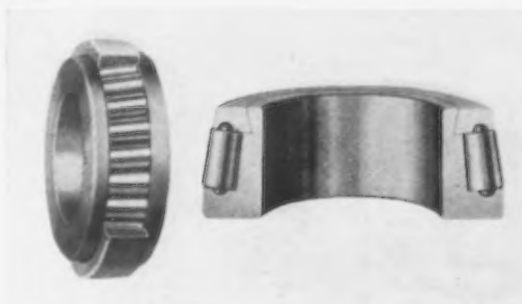
rolls in place when the cup is removed.

Among other claims for this design is that omission of the cage, leaving room for from 20 to 50 per cent more rolls, results in a relatively greater load carrying capacity for a given size. The double backplate contact of the rolls, plus a raceway entirely filled with tapered alloy steel rolls, is said to mean that no roll can get out

of place or overlap when operating even at high speed; positive line contact of rolls on the cone is inherent.

Adjustment of these bearings is made by methods now commonly used, normal wear being taken up simply by moving the cone assembly or cup. These tapered roller bearings are made in all S.A.E. sizes; they are interchangeable with all types of anti-friction bearings.

L EFT-hand view is of the bearing assembled with cup broken to show the rolls. Mounting of rolls is shown in the section view at right.



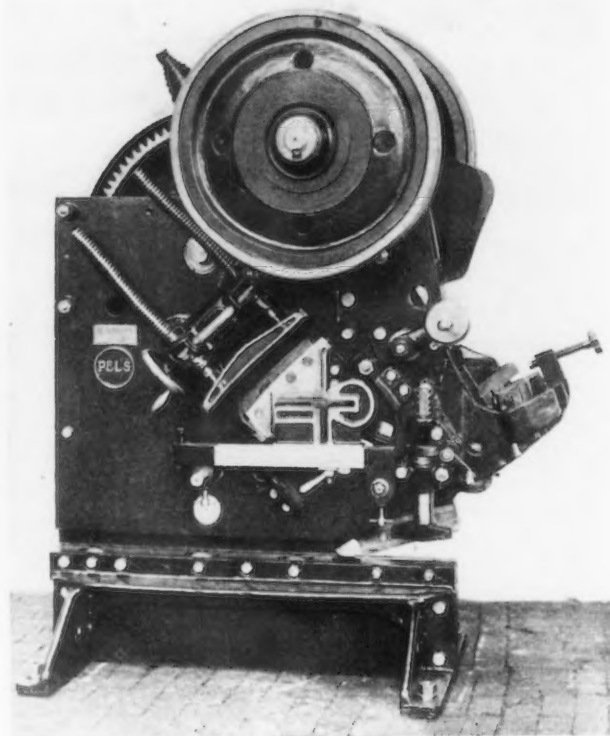
Offers Plate Shear and Bar Cutting Unit

THE shearing, notching and coping mechanism of the combination punch and shear manufactured by Henry Pels & Co., 90 West Street, New York, is now available as a separate unit. This new machine, designated as the type BmEFGE, is intended to meet the needs of welding shops where punching for rivets is not required.

In design, operation and capacity, the machine illustrated is exactly the same as the combination punch and shear except for the omission of the punch. Two sizes are made, corresponding to types MA-13 and MA-16 of the combination machines. These latter machines have been on the market for several years; an earlier model of this type was described in THE IRON AGE, Dec. 24, 1925.

Angles, tees and round, square and flat bars are sheared by a cutter moving on a diagonal slide, making it possible to bevel shapes in a horizontal position. Beams, channels and other sections are cut with special knives. These are easily inserted and may be used to cut flats too heavy for the

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INTENDED for welding shops, where punching for rivets is not required, this machine embodies only the shearing, notching and coping mechanisms of the combination punch and shear.
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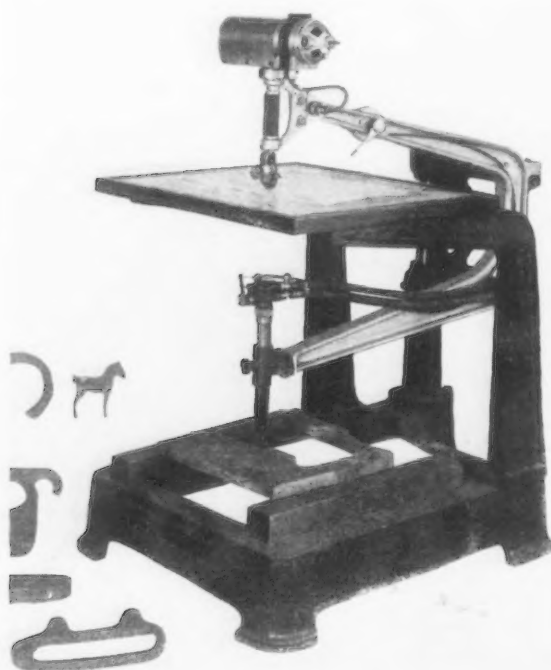
regular knives. Beams of maximum section of 6 in. x 12.5 lb. and 7 in. x 15.3 lb. may be handled by the two models respectively.

In addition to the diagonal knives, there is a plate shear as well as a built-in notcher. The latter may be exchanged for a coping device.

Oxygen Profile Cutting Machine Uses City Gas

USE of artificial or natural illuminating gas at normal low pressures in connection with an oxygen jet features the operation of the

flame cutting machine shown in the accompanying illustration. Very narrow cuts are obtainable with this apparatus which has been placed on the



▲ ▲ ▲
ILLUMINATING gas with the oxygen jet is said to produce a smooth cut without injury to the press dies or other material being profiled.
▼ ▼ ▼

market by the American Oxycop Co., 430 Woodbridge Street, East, Detroit. Moreover, the gas flame is said not to injure steel in any way, thus making the machine suitable for roughing out press tool dies and for general toolroom use. Smoothness of the cut is a feature emphasized, and it is said that subsequent machining is unnecessary except for surfaces requiring a milled or ground finish.

The upper arm of the U-frame of the machine carries a motor-driven tracing wheel; the cutting head is mounted on the lower arm. Designed to be guided along the outlines of a blueprint placed on the tracing table, the tracing head may also be adapted for automatic templet work. Cutting feed is provided by a 1/50-hp. motor mounted on the tracing head. If electric power is not available, a spring motor may be used. The cutting speed is 1 ft. per min. for 1-in. plate.

The model illustrated is made in three sizes, having cutting areas from 18 x 18 in. to 2½ x 5½ ft. For profiling large plates, such as locomotive side frames, a longitudinal profiling machine has been designed to provide a cutting area of 3 x 18 ft. at one setting.

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On April 1 unfilled orders for brass and bronze ingots and billets on the books of the members of the Non-Ferrous Ingot Metal Institute amounted to 23,132 net tons.

Cantilever Yoke Features New Plain Squeezer

THE plain squeezer molding machine here illustrated is made by the Tabor Mfg. Co., 6225 Tacony Street, Philadelphia, in both plain squeeze and jar squeeze types with either stationary or portable mounting.

The yoke and link are of steel and the link has an exceptionally wide base. Unusual ease of operation, as well as proper rigidity, is claimed for the cantilever yoke. The pins on which the yoke swings are not adjustable to accommodate different depths of flasks, but are permanent pins working in accurately reamed, replaceable bushings. In the squeezing position the yoke has a three-point support, the third point being fixed, an arrangement making for rigidity. It is said that even after long service there need be no fear of ram-offs. The ramming block is adjustable; it requires only a few minutes for one man to make changes as required by flasks of different depths.

The machine is sand proof; all guide rods are inside the main cylinder and a cast-iron sand guard protects

Unusual ease of operation, as well as proper rigidity, is claimed for the cantilever yoke. The machine is sand proof.



the squeezing piston. Standard equipment includes vibrator, pressure gage, blow valve, riddle rack and shelf. The wheels of the portable type have an overall spread of 22 in. Only a 26-in. clearance behind the machine is required for complete backward travel of the yoke. The machine will be exhibited at the coming American Foundrymen's Association Exposition.

with those of the standard Cataract No. 4 bench lathe.

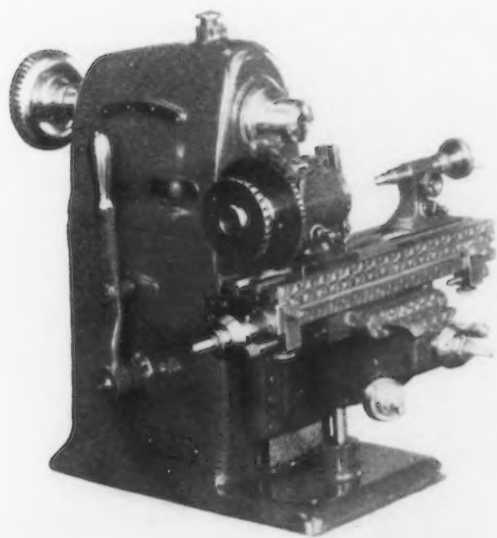
The working surface of the table is 3¼ x 12 in. Longitudinal, transverse and vertical travel of the table is 5½ in., 4 in., and 6½ in., respectively. Speeds range from 240 to 1725 r.p.m. The net weight of the machine is 105 lb.

Cataract Bench Milling Machine

AS companion equipment to the Cataract motor-driven bench lathe, the Hardinge Brothers, Inc., 4147 Ravenswood Avenue, Chicago, is producing a new motor-driven bench miller. Features include the fully-enclosed headstock, with V-belt drive, and a six-speed transmission controlled by a clutch and additional

speeds obtained by shifting one belt. In being mounted under the bench the drive unit eliminates overhead shafting and belts.

Left-hand cutters can be used by applying a reversing type of a switch to a standard reversible motor. Collets interchange between the cutter head of the milling machine and the dividing head, and interchange also



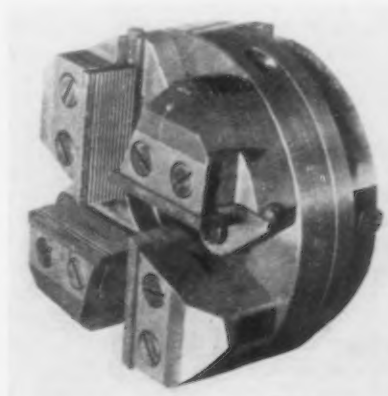
FULLY-ENCLOSED headstock, V-belt drive, and six-speed transmission are among the features of the motor-driven bench miller at the left.

TWO screws lock the adjustment of die head at right with a rigidity claimed to equal that of a solid die.

Adjustable Die Head for Valves and Fittings

A NEW solid adjustable die head for application to the special automatic machines with power feed and head reversing mechanism now used for threading pipe fittings and valves has been brought out by the Landis Machine Co., Waynesboro, Pa.

This tool, made in the ¼, 2 and 4 in. sizes, is compact and covers a wide range. It consists of four major parts, all of which are made of high-carbon steel, heat treated and ground. Adjustment for size is effected by two adjusting screws; these adjusting screws lock the die head and are said to impart rigidity equal to that of the solid die. The patented Landis chaser is employed.



Metal Trades Association Discusses Problems Created by Depression

WAYS and means of stabilizing industry, benefits and evils of unemployment insurance, and training of foremen and apprentices were the chief topics considered at the thirty-third annual meeting of the National Metal Trades Association, which was held at the Hotel Sinton, Cincinnati, on April 15 and 16. The luncheon, addressed by Dr. Herman Schneider, president, University of Cincinnati, and the annual banquet, with Rabbi Jacob Tarshish, Columbus, Ohio, as the principal speaker, were two high spots of a program marked by uniform excellence. Attendance at all sessions was large and the convention registration somewhat above normal.

Early in the meeting John W. O'Leary, Arthur O'Leary & Sons Co., Chicago, made an address on "Minding Our Own Business" which struck a popular note. He pointed out that the association has attained its present success through singleness of purpose, that is, by minding its own business. He likewise attributed some of the current economic ills to failure of many people to hold to this principle, and concluded that everyone can aid in a return to normality "by distinguishing between extravagance and good living, between common sense and hysteria, between gossip and fact, and minding our own business."

Mr. O'Leary said, in part: "Overproduction with resulting surpluses has been a sore trial, but to overcome it does not require a return to hand labor. A temporary moratorium of those factors which would further increase production where surplus exists or where facilities exist which will create further surpluses would be desirable until our social processes catch up. It sounds like heresy to suggest any curtailment of inventive genius, but unless new power to absorb can be coincidental with new surplus, we only retard progress, not aid it. Minding our own business does not mean that we shall abolish aids to real progress, but that we shall abolish aids which do not aid but retard. Our business enterprises today are on a firmer foundation because we are avoiding useless extravagances which always follow extravagant periods."

Defends the Machine Age

The standard of living of the American people has been raised to its present level by the automatic machine



J. G. Benedict
Relected President of National Metal Trades Association.

and that is the one and only reason why the standard in the United States and Canada is higher than that of even the millionaires of any other country, said Franklyn Hobbs, director of research, Central Trust Co. of Illinois, in an address on "The Machine Age and Its Consequences." He added that "more and improved machinery may make it possible for a man to earn more than a good living by working in a factory for a few hours a day without soiling his hands. The most senseless bit of buncombe offered for our consumption today is the bugaboo of technological unemployment caused by machinery. It takes more men and a larger percentage of our entire population to man our factories than it did a generation ago, and in that generation we have installed more machinery than any other country in the world has ever possessed. And where do we go from here? More machines, higher pay, easier hours, better working conditions and finer living conditions."

Mr. Hobbs declared that over a period of 30 years workers have received \$17 out of every \$100 of manufactured goods sold, or about two-fifths of the value added to materials through processes of manufacture. This has been proved 10 consecutive times by the United States Census of Manufactures. Yet in that period the substitution of machinery has made it

possible for one worker to produce as much as three did at the beginning of the period. "If the mill was producing 1000 units a day and through the introduction of labor-saving machinery was able to produce 3000 units a day, the workers received their 17 per cent on the additional 2000 units the same as on the 1000 units. Machines have made it possible during one generation for the worker to increase his income 200 per cent. The machines are earning two-thirds of the wages he receives. In lines of manufacture where mechanization has not gone far, wages are less, and in other lines, where mechanical assistance has reached the highest point, wages also have reached the highest point. The best paid factory workers are standing still most of the time watching a machine roll up money to stuff in their pay envelopes."

Enough machinery and labor-saving equipment has been installed in American plants in the last 30 years, claimed Mr. Hobbs, to displace more workers than there are inhabitants on the continent of North America. In England, Germany and some other countries much less machinery has been introduced than in the United States. The same is true of China, where installations have been so few that practically no one has been thrown out of work by machines. Accordingly, there should be no unemployment in China or India and little in Germany and England as compared with the United States. "It should not be necessary to present any evidence beyond these comparisons," said Mr. Hobbs, "to prove that the introduction of machinery to replace manual effort has been the sole cause of improvement in working conditions and in wages, and in reduction of unemployment."

Employers Trying to Keep Men at Work

Never in history have employers gone to such lengths as at present to keep their workmen employed, stated J. G. Benedict, Landis Machine Co., Waynesboro, Pa., in his annual report as president of the association. Workmen as a group recognize this, and as a result "we have passed through this major depression with relatively few labor difficulties and a better general understanding of each other's problems." Mr. Benedict emphasized that out of the 53 strikes in the metal

trades in 1929 only one was within a plant of an association member. No Government figures are available for 1930, but only one strike occurred among the organization's membership of over 1000 plants. Over a period of eight years there have been only 14 strikes in member plants.

Mr. Benedict called attention to the fact that the American Federation of Labor at Detroit four years ago pledged itself to unionization of the automobile industry, but has failed in the attempt. A strenuous effort is now being made to unionize the aircraft industries, but here again the federation has made little progress.

"There was a time when apprentices were added to the payroll promiscuously during times of prosperity and at the first signs of business curtailment were laid off indefinitely or discharged," said Mr. Benedict. "Fortunately this condition has not been prevalent in the past year and I believe that the persistent efforts of our educational department have done much to discourage this unsound practice. The progressive employer realizes that in order to obtain the greatest return from scientific management, he must continue to develop and train apprentices."

The depression has brought a flood of legislative proposals, many of which, if enacted into law, would give expression to a paternalism that must eventually work hardships upon the entire body politic, said Mr. Benedict. This is perhaps the outstanding problem with which manufacturers will have to cope in the immediate future. The chief difficulty is the failure on the part of the general public to recognize industry's problems and what it is doing to solve them, largely because "industry is inarticulate in its own definitions and statements."

"Notwithstanding the shrinkage in production, and loss of markets, the employer has given evidence of a new and highly commendable attitude toward the difficulties accompanying widespread unemployment. This new attitude has had the immediate effect of diminishing the degree of distress. It may seem trite to urge upon you the closest application to the solution of these problems, but it is so important that I venture to do so with the belief that what has been done forebodes an approach to the problems of industrial relations on a sound economic basis, and that a greater interest on the part of employers will help to level off the peaks and hollows of industrial operations. In addition, I believe it will help to solve the problems of scientific production, of distribution, training, leadership and the elimination of waste."

In presenting the report of the com-

mittee on industrial relations, Dr. Otto P. Geier, Cincinnati Milling Machine Co., Cincinnati, said that unemployment problems can best be solved by men who are charged with meeting payrolls regularly rather than by those unfamiliar with industry. The committee agreed that the causes of fluctuating unemployment are so complex and so deeply interwoven in the fabric of the social and economic structure that treatment cannot be successful if applied only to obvious isolated symptoms. It is, therefore, unreasonable to expect satisfactory results from a single panacea, such as the State unemployment insurance plans in Europe.

Careful analysis of legislative proposals for State unemployment insurance plans, craft unemployment reserve funds, super-credit corporations and similar propositions have not revealed sufficient merit to justify encouragement. On the other hand, each such proposed remedy does reveal inherent weakness and unsound principles, some of which may actually aggravate and increase unemployment. It only beclouds the issue and delays progress to lay at the door of management the entire responsibility for a condition largely beyond its control. It is obvious, continued the committee, that the responsibility for cycles of unemployment must be shared by the public and by mercantile, professional and agricultural management. However, a portion of responsibility rightfully belongs to industrial management.

Dr. Geier observed that "we have perhaps been going at such a fearful pace that we did not see where we were going. Had we been thinking, planning, looking ahead and properly scheduling our productive machinery, the slump might have been less severe. The cycle would have been less severe if we had not oversold the market. In encouraging purchase of things by time payment methods, have we not discouraged old-fashioned thrift and savings upon which purchases formerly were predicated? The average man has mortgaged his future through time purchase payments, as our per capita debts for this purpose today equal \$250.

"The public, as evidenced by widespread proposed legislation, has apparently made up its mind that a repetition of cycles of severe unemployment is intolerable. Shall industry continue a policy of mere opposition, which is bound to fail in the end, or shall we study, plan and propose sound economic principles to be incorporated in any laws that are offered? Thus we can avoid those undermining vicious effects that crept into European insurance plans.

"We should not be concerned deeply over the fact that an unemployment insurance scheme is on the way, but rather that it should have those elements within it that are generously American, making for thrift, stability and good, industrious citizenship, independence of thought and action, maintenance of self-reliance, and eager productivity. Surely the legislative proposals so far offered do not contain these safeguards.

"The leading industrialists, the big corporations have accepted the issue and have joined with their employees in setting aside thrift funds for use on a rainy day. It devolves upon the rest of us, not large enough to set up machinery of our own, to get together either by crafts, communities or a State-wide method to reduce the vitiating, undermining effect on our fellow workers of protracted cycles of unemployment."

This problem calls for collective thinking, such as is possible through organizations like the National Metal Trades Association, declared Dr. Geier, who remarked that meetings once a year will not suffice. Instead the committee proposes that every local branch of the association appoint its own industrial relations committee to meet every month to discuss this and related problems. He warned the association that "the margin of profit for industry is ever narrowing. It may be that our failure to take a broader social view of our business may bring upon industry costs that are just sufficient to wipe out that rather narrow margin of safety."

Apprenticeship Training Should Not Be Neglected in Dull Times

Harold S. Falk, Falk Corp'n., Milwaukee, emphasized that drastic curtailment of apprenticeship training is unthinkable, despite the financial stringencies of the moment, and that the time to prepare for prosperity is in a dull period. Reporting as chairman of the educational committee, he said that the manufacturer who concentrates all of his time on immediate problems, neglecting the more remote but more important ones, is not likely to survive. He admonished that the nature of industrial education makes it unwise to interrupt it in dull times.

Safety activities in a plant should be delegated to one man, who enjoys the confidence of the workers and likewise is a worthy representative of the management, said Philip M. Morgan, Morgan Construction Co., Worcester, Mass., in his report as chairman of the safety and accident prevention committee. He described the inter-



branch safety contest, which began on Jan. 1 and in which 167 member plants in nine branches are entered. The plan is to furnish an "alphabet series" of bulletin board posters to keep the safety idea before the workmen in these plants. At the end of every month a report of the standing of the plants in a given community is distributed and the position of the community in relation to other communities is announced.

This is a period when profits must come from decreased production costs rather than from increased selling price and therefore the foreman must be "cost conscious" if he is to be of maximum value to his company, said C. W. Pendock, LeRoi Co., Milwaukee, in a discussion of foremanship training accomplishments. He must be a "clutch" between the management and the workmen, able to interpret the company's policy to the men and at the same time command their loyalty and respect.

A foreman should not be prodded and watched by the management, stated Mr. Pendock. His initiative should not be destroyed by providing all of his detailed activities for him instead of letting him work them out himself. He should be given a chance to "carry the message to Garcia." Moreover, it is not sportsmanlike to take a man from the ranks and not give him the proper working tools in the form of a better understanding of his job by means of a training program.

"Unemployment Clinic" Held

At what might be termed the "unemployment clinic" session, Glenn A. Bowers, Industrial Relations Councilors, Inc., New York, spoke on "Europe and Unemployment Insurance"; M. B. Folsom, Eastman Kodak Co., Rochester, N. Y., described the "Rochester Unemployment Benefit Fund"; and James D. Craig, Metropolitan Life Insurance Co., New York, discussed "The Possibilities of Private Unemployment Insurance." Samuel O. Dunn, editor, *Railway Age*, pleaded for support of railroads in their battle against less regulated forms of transportation. H. W. DeBruin, Jeffrey Mfg. Co., Columbus, Ohio, told of the "Results of Organized Apprenticeship," while former Senator A. O. Stanley of Kentucky made an address on "Individual Initiative and Business." United States Congressman Charles Audrey Eaton of New Jersey outlined the "World Background of American Business." E. F. DuBrul, manager, National Machine Tool Builders' Association, Cincinnati, spoke briefly on machine tool obsolescence, taking the place of Magnus W. Alexander, chairman National Industrial Conference Board, who was unable to be present, and who was scheduled to speak on another subject.

A motion picture, "Two Questions—One Answer," showing the career of of an apprentice at the Bell & Howell Co., Chicago, provided a pleasant

interlude at the Wednesday afternoon session.

J. G. Benedict Re-elected President

Mr. Benedict was reelected president of the association; Jacob D. Cox, Jr., Cleveland Twist Drill Co., Cleveland, first vice-president; and John W. O'Leary, treasurer. Alexander Sellers, William Sellers & Co., Inc., Philadelphia, was named second vice-president. Councilors elected for two years were

W. R. Angell, Continental Motors Corp., Detroit; H. S. Chafee, Builders Iron Foundry, Providence, R. I.; Roe S. Clark, Package Machinery Co., Springfield, Mass.; F. A. Pahl, Continental Can Co., New York; J. A. Sheldon, Willys-Overland Co., Toledo; and A. H. Tuechter, Cincinnati Bickford Tool Co., Cincinnati. W. D. Hamerstadt, Rockwood Mfg. Co., Indianapolis, was elected councilor to fill an unexpired term.

U. S. Steel Licensed to Make Rustless Steel

An arrangement has been concluded by the United States Steel Corp. with Friedrich Krupp, A. G., Germany, whereby the subsidiary companies of the Steel Corporation are licensed by Krupp under various patents of Strauss, Johnson, Armstrong, Fry, Kuehn and Smith for rust-resisting and heat-resisting and other alloy steels, and for their heat treatment.

This arrangement, which includes the collaboration of Krupp with respect to technical matters in connection with corrosion-resisting and heat-resisting steels, etc., will apply to the products of the Illinois Steel Co., Carnegie Steel Co., American Steel & Wire Co., American Sheet & Tin Plate Co., National Tube Co., and Lorain Steel Co. The major products manufactured by these companies in corrosion-resisting and heat-resisting steels include shapes, plates and bars, strip, wire products, rope, sheets, tubes and castings.

Building Contracts in March Showed Gain

A healthy sign in the construction industry is seen by F. W. Dodge Corp., New York, in the expected seasonal but well distributed advance in all the 13 Dodge territories during March over the preceding month. A total of \$370,406,300 in contracts awarded in the 37 States east of the Rockies is reported for March in comparison with \$235,405,100 for February. This was divided into \$101,337,600 for residential building, \$117,346,900 for non-residential, and \$151,721,800 for public works and utilities.

Although comparisons with March of last year are less optimistic, they indicate a forward movement in six of the 13 territories. These were New England, with a \$38,899,300 monthly total; upstate New York, with a \$17,065,300 total; central Northwest, with \$9,765,500; southern Michigan, with \$13,317,200; St. Louis, with \$16,960,300, and New Orleans, with \$14,496,600. Texas came within \$200,000 of matching March of last year.

Results for the first quarter showed gains over the same period of 1930 in the New England, central Northwest, and New Orleans districts. The New England gain was due to public works and utilities. Residential and public works and utilities accounted for the go-ahead in the central Northwest region. In the New Orleans territory the increase was due to gains in non-residential building and public works and utilities, while residential building declined.

Metropolitan New York and central Northwest registered quarterly gains over 1930 in residential building. Of the three major construction groups, this type building made the best relative showing for the quarter which ended with March, for it recorded only a 4 per cent loss from the first quarter of last year. January accounted for this entire loss, with February showing a gain, while March virtually reached the total for March, 1930, its \$101,337,600 nearly matching the \$101,491,600 of March last year.

With the lower construction costs now obtainable, floor space is said to reflect new construction volume with perhaps more accuracy than valuation figures. On a floor space basis, residential contracts exceeded the corresponding quarter of 1930 by more than 2 per cent.

Data on Pipe Welding

The Gas Products Association, 250 East Ontario Street, Chicago, an association of independent manufacturers of gas welding and cutting equipment and supplies, has issued a 44-page booklet on pipe welding. This booklet contains information on important phases of the various types of welded steel and wrought iron piping systems for industrial uses. The subjects covered include alignment, spacing, tacking tables for the layout of templates for cutting pipe intersections, branches, reducers and bull-plugs; the fabrication of headers, the use of tube-turns, long neck welding flanges and the construction of expansion loops and anchors. In addition to this, the booklet contains tables of cost data for the welding and cutting of all sizes of pipe from $\frac{3}{8}$ in. to 30 in. diameter.

Reclaiming Iron and Steel

Scrap Quickly Pays for Investment in Equipment

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OF THE three papers presented at the "scrap compressing" session of the American Society of Mechanical Engineers in Cleveland on April 13, the one by Mr. Giles and that by Mr. Nowak have already been published in *THE IRON AGE*. The paper by Mr. Giles began on page 1158 of our issue for April 9, while Mr. Nowak's paper was in the April 2 issue, beginning on page 1097. The third paper, "Handling of Automobile Body Scrap," which was read by R. R. Reese, plant engineer, Packard Motor Car Co., Detroit, is abstracted briefly in succeeding paragraphs.

In the discussion of these papers it

was brought out particularly by Mr. Jacobsen, chief engineer, Galland-Henning Mfg. Co., press maker, Milwaukee, that the price margin between loose and baled scrap is becoming less and less attractive to the scrap yard. This makes less incentive for the outside yard to do any preparation of the scrap in the way of baling. The speaker referred to the handling of 30,000,000 tons of scrap through the various scrap yards in 1929, for the making of 56,000,000 tons of steel, and spoke of this as being a long step forward in the conservation of our natural resources.

taken up by the excessive bulk of scrap steel under the original method.

Cast Iron Borings and Turnings

CAST iron borings and turnings represent a sizable item of scrap in automotive manufacturing. Most of this scrap is formed in a few machine departments of the factory, because of the large amount of cast aluminum and steel required in manufacturing the vehicles. Of the total cast-iron borings, 80 per cent is made in the cylinder and cylinder-head machining. Therefore a study was made as to the best solution for this department in relation to the reclamation of this material.

The plan finally adopted consisted of a series of drag cable conveyors located below floor level, and to the rear of the machinery lines, each line being connected to the main conveyor by a cross conveyor of the same type. Special attention was given to the design of chutes and spouts from the machines for delivering the borings and turnings, as formed in the machines, directly to the conveyor. This almost completely eliminated handling of the chips by hand.

At the end of the cylinder department is a 24-in. chute extending from the first to fifth floors, with openings at each floor level. This chute receives all chips delivered to it by buggies from other cast-iron machine departments and discharges into one of the drag cable conveyors. The main underground conveyor discharges the borings to a vertical bucket elevator which in turn discharges into an overhead storage bin.

Borings from the overhead bin are fed by gravity to the briquetting machine. The briquettes formed are 2¼ in. by 2¾ in. in size and weigh 2½ lb. each. They are discharged automatically into special steel trailers. These trailers are picked up at regular intervals and hauled to the found-

Sheet Steel Salvage in Packard Plant

ORIGINALLY the metal-stamping plant was located in a building formerly used for the manufacture of truck frames. It had low ceilings, with the steel trusses only 16 ft. from the floor. This was in no sense ideal for the best layouts of large presses and overhead conveyors and cranes for the handling of materials. It was therefore necessary to dispose of metal scrap from the presses into large steel buggies by hand. As the buggies were filled they were pushed to the outside of the building and reloaded by hand into a large truck.

This truck was the property of a local scrap dealer. After filling, it was delivered to his yard, where the material was again handled, preparatory to shipping to the mill. There was a large amount of hand work involved in the original scheme, and there was a relatively small amount of scrap handled, because of its large bulk as compared to weight.

An engineering study resulted in the installation of a baling press in a

building adjacent to the stamping plant. This press is located at floor level, where the scrap metal can be dumped directly into the receiving hopper from the buggy. When a sufficient quantity of scrap is in the hopper, the hydraulic press forms a bale 14 in. by 20 in. by 20 in., weighing approximately 500 lb. From the press the bale is discharged automatically on to a slat conveyor, which delivers the bales directly into gondola railroad cars for shipment to the mills.

Scrap metal is not touched by hand from the time it leaves the stamping press until it reaches the railroad car ready for shipment. This method represented a large saving in man power and, in addition, there was a marked increase in price for the baled scrap as compared with the bulk.

During 1929, 9875 gross tons of metal scrap was baled, representing a net return on the investment of 150 per cent. In addition to the financial return, considerable floor space was conserved, because of the large area

dry, where the briquetted borings are picked up by a magnet and placed in the cupola charge. In 1929, 2414 tons of cast iron briquettes was produced, representing a net return on the investment of 85 per cent.

In addition to the direct savings by the salvage of these iron borings, there was an indirect saving. Six men necessary under the original plan, for removal of borings from machines and the long trucking to the central salvage station, were released for other duties.

Steel Turnings and Borings

AFTER the results accomplished with the salvage of cast iron turnings and borings, attention was next turned to the salvage of steel turnings and borings. The original method of handling this scrap was by the collecting of the steel turnings into small buggies in the various departments, and its transfer to a central location, where it was forked into large trailers and moved to a local scrap dealer, who paid a very small price for the turnings.

Great quantities of oil were contained in the chips leaving the machine departments. The oil contained was of sufficient quantity to justify equipment for its extraction and its proper filtering and reclaiming. This, then, became one part of the problem.

It was found also that the bulk of the chips would present a problem in efficient handling, because in machining operations chips are formed in short, irregular shapes, long strings, or in tightly curled formation, and in these shapes are most difficult and costly to handle. It was decided that an operation that would crush the chips into regular form would materially improve this condition. After crushing it was found that the weight of the chips per cubic foot was low and that, if it were possible to briquette the steel chips similarly to cast iron, additional savings could be accomplished.

Chute Cares for Product of Five Floors

Because the steel chips are produced on five floors, steel chutes 24 in. in diameter are installed along the outside of the machining building and terminate at the second floor of the salvage building. Chips are collected at the machines by small steel buggies and are transferred to the chutes and dumped by hand. The steel chips pile up on the second floor and are raked from this location to a hole in the floor, which feeds into the crusher hopper located on the floor below.

After being crushed, the chips are carried up a bucket elevator, which delivers them to an overhead hopper on the second floor. From the hopper it is possible for the chips to flow by gravity either to the extractors on the second floor, or directly to the hopper of the briquetting machine on

the first floor. When the chips are put through the extractors, the extractor basket is lifted by an overhead monorail hoist and dumped into the briquetting hopper at floor level.

After leaving the briquetting machine, the briquettes drop on to a slat conveyor, which in turn dumps them into large steel trailers. As the steel trailers are filled, they are hooked into trains and hauled to the north part of the plant, where they are dumped into gondola cars preparatory to shipment to the mills.

Good Return on Investment in Equipment

As all probably know, the automotive industry uses many different types of steel, from a low-carbon to a high-nickel steel, as well as special steels used in forging and body dies.

Each of these steels has a different characteristic in regard to its ductility. Because of this, the forming of a dense briquette became one of the problems. It was immediately found that it was impossible to briquette separately some of the toughest steels; but it was found that, by mixing the different steel chips, this difficulty was overcome and briquettes of proper density could be made.

Oil reclaimed amounts to 140,000 gal. a year, representing a net return of 18 per cent on the investment. Under normal conditions, 2700 tons of steel chips a month are accumulated. The market value of briquetted chips is about 60 per cent more than for bulk chips. This item represented a net return on the investment of 42 per cent, or a combined total for the oil and briquettes of 60 per cent.

Pennsylvania Railroad Adopts 152-lb. Rail

Adoption of a 152-lb. section steel rail by the Pennsylvania Railroad, which will first be laid on the main line between Pittsburgh and Altoona, Pa., has been announced by John F. Deasy, vice-president in charge of the Pennsylvania's Central Region, with headquarters at Pittsburgh. Early in May the Carnegie Steel Co. and the Bethlehem Steel Co. will roll the first heats of the new section designed after two years' investigation and research by a committee of the engineering department of the railroad and engineers and metallurgists of the two steel companies.

The new rail has been worked out to meet the requirements of sustaining 100,000-lb. axle loads at speeds of 100 miles per hr., as compared with present maximum requirements of 80,000-lb. axle loads and 80-mile speeds. With a weight of 152 lb. to the yard, the new section represents a gain of approximately 75 per cent in strength as compared with the 130-lb. section in present use on the main line.

According to Mr. Deasy, studies in connection with the design of the heavier section also revealed that the 130-lb. section may be redesigned in such a way that the addition of only 1 lb. per yard in weight will bring about a gain of 22 per cent in strength with substantially no increase in cost. A new form of rail splice bar providing resiliency at the rail joint, greatly reducing wear of the rail ends and increasing the quietness and smooth-riding qualities of the track, is a further innovation. In commenting upon the change, Mr. Deasy said:

"The Pennsylvania Railroad's present main line standard-section rail is rolled in accordance with a design adopted in 1916. Increased traffic since the war period, and particularly the changes in operating practices which have resulted in much heavier train loads and greatly increased axle

loads, have been accomplished by growing costs of track maintenance. Our engineers several years ago reached the conclusion that a stronger and heavier rail than the present section would be required to stand up satisfactorily under the demands of operation, reducing excessive track maintenance expenses and providing for further increase in service demands of the future."

Sheet Sales Gained 40 Per Cent in March

Sheet sales by independent mills gained 40 per cent in March over February, according to the monthly report of the National Association of Flat Rolled Steel Manufacturers. Production increased 16 per cent over the previous month and shipments showed a corresponding increase. Sales were 236,310 tons, compared with 168,564 tons during the previous month. Production was 224,322 tons, against 192,218 tons in February. Shipments were 208,207 tons last month, compared with 179,138 tons during the previous month. Sales were the largest during any month since April last year, production larger than during any month since last May and shipments better than during any month since last June. Unfilled orders April 1 were larger than at any previous time since September. The March report and comparison in net tons follow:

	March	Feb.	Jan.
Sales	236,310	168,564	180,863
Production	224,322	192,218	167,865
Shipments	208,207	179,138	170,379
Unfilled orders	383,280	343,439	360,479
Unshipped orders	100,581	89,567	92,789
Unsold stocks	89,334	92,047	87,496
Capacity per month	543,400	496,850	551,290
Percentage reporting	67.6	67.6	67.6
Percentages, Based on Capacity			
Sales	64.3	50.2	48.6
Production	61.1	57.2	45.1
Shipments	56.7	53.3	45.7
Unfilled orders	104.3	102.3	96.8
Unshipped orders	27.4	26.7	24.9
Unsold stocks	24.3	27.4	23.5

Steel Treaters' Group Meeting at Hartford Attended by 650

Several Chapters Join in One-Day Session Devoted to Technical
Discussions and Plant Inspections



SUCCESS beyond the expectations of the promoters attended the first group meeting of the six New England chapters of the American Society for Steel Treating at Hartford, Conn., April 14. With the Hartford chapter as host, the Boston, Springfield, Worcester, New Haven and Rhode Island (Providence) chapters joined in a one-day technical and plant visitation meeting which brought a registration of nearly 650 members and guests, resulting in the largest meeting of this nature ever held by the society.

Attendance from other chapters was large, also, there having been representatives from Chicago, Pittsburgh, New York, Philadelphia, Detroit, Cleveland, Schenectady, Syracuse and other cities. Automobiles brought a special delegation of 12 members of the New Jersey chapter from Newark. The New York chapter was credited with 10 members, and there were six present from the Lehigh Valley chapter. All the national officials were there, as well as several of the directors and five of the past-presidents.

Two technical addresses made up the program for the morning session in the ball room of the Hotel Bond. After introductory remarks by H. J. Fischbeck, metallurgist, Pratt & Whitney Aircraft Co., and chairman of the Hartford chapter, and an address of welcome by Mayor W. E. Batterson

of Hartford, the meeting was turned over to the technical chairman, Edwin F. Cone, associate editor of *THE IRON AGE* and chairman of the New York chapter, who called attention to a new development in the life of the A.S.S.T.—the group meetings. These have displaced the former sectional meetings which were organized by the national office, the last one having been held in New York in February, 1930. Pioneers in the group meeting movement, such gatherings being entirely in the hands of the local chapters, have been the Lehigh Valley, Philadelphia and New York chapters, which have held two such meetings, the largest one in May, 1930, in cooperation with the New Jersey chapter, and attended by about 500.

Both technical addresses were discussions of commercial investigation and research work brought before the large attendance of over 650 as running comment on illustrations thrown on the screen. E. W. Page of the General Electric X-Ray Corp., Chicago, spoke on "X-Rays in the Metal Industry," and Dr. V. O. Homerberg, Massachusetts Institute of Technology, Cambridge, Mass., took as his subject "Recent Developments in Nitriding."

Defects Revealed by X-Rays

A large number of radiographs of common defects in many forms of metals were shown by Mr. Page. His

laboratory has investigated many kinds of castings such as gray iron, malleable, steel, aluminum, as well as die castings, in which many unsuspected defects have been detected by the X-ray. He emphasized the value of this method of examination in that in many cases changes in the method of gating or heading or other modifications of foundry practice, resulting from the locating of such defects, corrected the evils. Examples of good and bad welding were discussed.

Rapid Progress in Nitriding

That extremely rapid strides are being made in the nitriding process and its applications was the firm impression which Dr. Homerberg left as a result of his address. There are now three nitriding steels available and being used commercially, said Dr. Homerberg. One is the original nitralloy steel known as the chromium-aluminum-molybdenum type, and then there are two others developed recently: an aluminum-molybdenum steel containing about 1 per cent of each metal, and a chromium-vanadium steel of about 1.50 per cent chromium and 0.40 per cent vanadium.

Several developments were briefly referred to by Dr. Homerberg, among which is the importance of nitriding special alloy steels, such as high-speed and other tool or die steels, the problem of containers for the nitriding box or furnace, the nitriding of slightly decarburized steels in the presence of a carburizer, and the welding of nitrided steels.

Considerable progress has been made in the nitriding of special alloy steels, and the advantages to be derived are just being appreciated. There are several new developments in containers among which may be mentioned a chrome-nickel composition which is successful in Europe; it contains about 0.10 per cent carbon, 25 per cent chromium and 20 per cent nickel, with a life of some 12,000 hr. Enameled containers have proved quite satisfactory, and a brick-lined container or furnace recently developed is meeting with success. The welding of nitrided steels has been

OFFICERS, SPEAKERS AND LOCAL LEADERS OF HARTFORD GROUP MEETING



Left to Right, First Row—V. O. Homerberg, associate professor of physical metallurgy of Massachusetts Institute of Technology; W. H. Eisenman, secretary of the A. S. S. T., Cleveland; R. G. Guthrie, chief metallurgist, Peoples' Gas & Light Co., Chicago; A. O. Fulton, treasurer of A. S. S. T., president of the Wheelock-Lovejoy Co.; W. B. Coleman, director of the A. S. S. T., consulting metallurgist, and E. W. Page, speaker, General Electric X-Ray Corp., Chicago. Second Row—D. A. Nemser, chairman of arrangements committee, Hartford; Henry J. Fischbeck, chairman, Hartford chapter, A. S. S. T.; J. Allison, chairman, publicity; R. M. Bird, past president A. S. S. T., Midvale Steel Co.; E. F. Cone, technical chairman, morning session, associate editor, *THE IRON AGE*; A. H. d'Arcambal, vice-president A. S. S. T., consulting metallurgist, Pratt & Whitney Co., and H. I. Moore, chairman program, Hartford chapter, A. S. S. T., Firth-Sterling Steel Co.



Part of the bus line of plant visitors in front of Pratt & Whitney Co.'s buildings

accomplished by the use of atmospheric hydrogen. More details of the results of nitriding in the presence of a carburizer are promised in the near future.

Because of lack of time, discussion of these two addresses had to be dispensed with.

Three Plants Visited

One of the chief reasons for the success of these group meetings is the plant visitation feature to which the afternoon is devoted. Three plants were on the list last week, those of the Pratt & Whitney Co., the Pratt & Whitney Aircraft Co. and the Chance Vought Corp. It required 19 buses to convey the 500 men who signed up for the trip, the plants having been visited in the order named. Upon arrival at the Pratt & Whitney plant each man was handed a carnation, one color to each bus load, thus dividing

the large crowd into groups for guidance through the plant.

Over 500 attended the dinner at the close of the day. The feature of this was an address by Dr. Zay Jeffries, consulting metallurgist, Cleveland, and past-president of the society. Frank P. Gilligan, vice-president, Henry Souther Engineering Co., Hartford, also a past-president, was toastmaster.

Metallurgists in Industry

Dr. Jeffries took as his subject "The Metallurgist in Industry," and delivered a review of the progress of the iron and steel and non-ferrous industries and the important relation of the metallurgist to the new developments of recent years, emphasizing those in light aluminum alloys, in tungsten filaments, in tungsten and tantalum-carbide cutting tools, in hardening by dispersion and so on.

that control is available to reduce the ultra-violet light as desired.

The dining room is separated by a movable partition, so that the entire space may be made into a single room. The front of the dwelling is effectively utilized for bedroom, bath and exercise room, with movable partitions on the ground floor and a full 22-ft. window, while the second floor space provides a library and a roof garden, part of the latter under cover and part open to the sky.

Reduced Capacity for Steel Castings

A decline of nearly ¼ per cent in our total capacity for production of steel castings is reported by American Iron and Steel Institute. The drop is from 2,097,995 tons Dec. 31, 1929, to 2,083,085 tons one year later. Electric and crucible steel capacity and that for basic open-hearth steel advanced. Bessemer capacity and that for acid open-hearth steel were reduced. The table shows the situation for the two years.

	Dec. 31, 1930	Dec. 31, 1929	Percentage Change	
			Inc.	Dec.
Basic open-hearth	811,310	806,010	0.66	...
Acid open-hearth	691,290	714,690	...	3.27
Total open-hearth	1,502,600	1,520,700	...	1.19
Bessemer	37,875	46,935	...	19.30
Electric	540,615	528,415	2.31	...
Crucible	1,995	1,945	2.57	...
Total	2,083,085	2,097,995	...	0.71

Aluminum, Steel and Glass Dwelling Exhibited

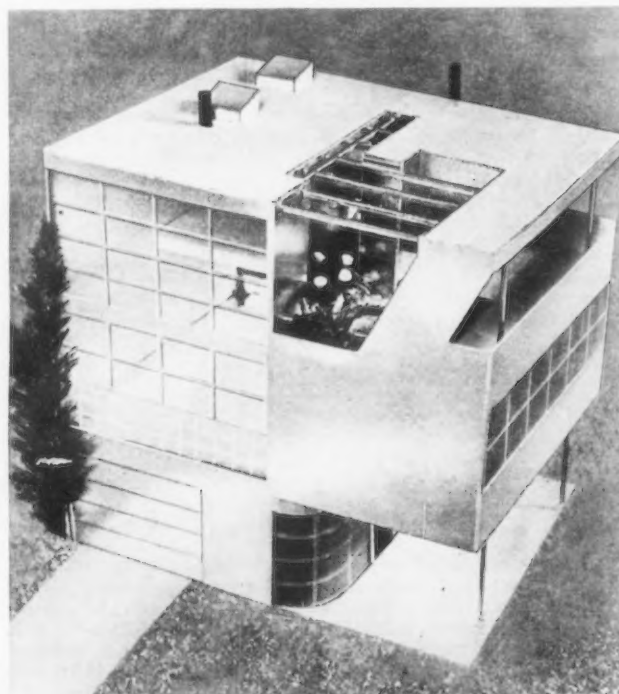
An all-metal and glass dwelling is a feature of the Architectural League Show, which opened April 18, in New York. Walls of masonry have been replaced with 3-in. sections of insulation, protected with aluminum sheets, ribbed in fine corrugation to reduce glare, and allowance is made for expansion and contraction of the metal from temperature variations. The frame is of aluminum alloy and steel and all flooring is light battle-deck construction surfaced with rubber and linoleum. Supporting walls are eliminated by use of slender aluminum columns upholding cantilever beams, from which the outside walls are suspended.

On the ground floor are the entrance hallway, heating plant and garage, as there is no cellar, and there is a living room two stories in height. In one wall is a 17-ft. section of ultra-violet glass.

Neon tubes paralleling the tops of the windows provide night illumination, and white, colored or ultra-violet light is available by the turn of a dial. Harmful short rays have been filtered out so that a person may safely remain under the light 24 hr. a

day. Special asymmetric chromium reflectors and refracting lenses spread this light. A row of ultra-violet tubing is arranged in a revolving reflector midway up the windows, so

A DWELLING of new type is embodied in the model made of aluminum, steel and glass at the Architectural League Show, New York.





U. S. STEEL'S "BONUS" PLAN

THE profit sharing plan of the United States Steel Corp., corresponding in a large measure to what is called the bonus plan in the case of other companies, was divulged at the annual meeting of the stockholders of the corporation at Hoboken, N. J., April 20. It was inaugurated in 1921, but payments did not begin until 1923. The plan becomes operative only when there is a net income of \$100,000,000 after allowing for all charges, taxes and depreciation.

In the eight years the average annual distribution has been \$3,122,168 shared among 2574 officers, executives and the like. The largest payment to any individual in 1930 was \$42,572 in cash and \$28,258 in common stock.



INITIATIVE WINS

RUSSIAN industry goes on a piecework basis on May 1. All men may be equal from a theoretical standpoint, but it is not practical to expect skillful and energetic workers to exert themselves fully unless initiative is recognized in the pay envelope. It is proverbial that lazy people have the largest appetite; no one is ever late for meals in a poorhouse.

Having recognized the fact that initiative must be proportionately rewarded in the field of labor, Russia's next logical step is to apply the same principle to management and finance. Then it will be back on the old capitalistic basis again.

The five-year plan may accomplish one thing for Russia and the world at large. It may prove that the pleasant theories of equality of reward and ownership are weak sticks to lean upon when the program calls for substantial economic accomplishments.

PRICE AND VOLUME

ELSEWHERE in this issue are extracts from an address by Magnus W. Alexander, in which he suggests that lower wage rates, by permitting lower selling prices, might stimulate business through better buying.

Drastic price declines which have already occurred have not had a particularly stimulating effect on sales. It is a question as to how much power price reductions have when the atmosphere is clouded through fear psychology. And it is hard to see where cutting wage rates would provide the reassurance to overcome this fear.



YOU WILL BE SALUTED

ALL members of the machinery building and using industries should "listen in" Sunday evening, 9:45 Eastern daylight time. Westinghouse Electric & Mfg. Co. will broadcast a salute to the machinery industry via National Broadcasting Co.'s network. Carl A. Johnson, president, National Machine Tool Builders' Association, will respond with a message of constructive value to all users and makers of industrial machinery and equipment. He will announce a program for putting our idle men and money to work to restore prosperity.



LARGE NEW PROJECTS

\$1,000,000 for new oil pipe lines in eastern Texas, by Sinclair Consolidated Oil Co., New York.

\$6,000,000 for hydroelectric developments on the Rio Grande, by Ulen & Co., New York.

\$2,000,000 for centralized school, shops and training camp, in Brooklyn, by New York Fire Department.

PASSING THE BOUQUETS

AMERICAN section of International Chamber of Commerce lauded mass production in a report issued last week, but said that it has not been the controlling factor in the growth of the United States. "While it has increased the volume of employment, raised the standard of living and added to our national wealth, there are other factors that have played an important part in American prosperity. Among these are the abundance of natural resources, the lack of artificial trade barriers, the inventive genius of American scientists, the business acumen of American industrialists, the mechanical ingenuity of American engineers and the skill of American craftsmen."

True it is that we should not credit one factor for all of our progress any more than we can pick one single cause for the depression. But while handing out the credit for technological advance, why not mention the American business and trade papers which have done so much to tell people how?



MACHINERY EARNS WAGES

MACHINERY now earns two-thirds of the wages paid to our workers, according to Franklyn Hobbs, director of research of the Central Trust Co. of Illinois. Substitution of machinery for hand work during the past 30 years has enabled one man to produce as much as three men could at the beginning of this period. Yet, during that period labor has maintained its pro-rata share of total output sales value at approximately \$17 for every \$100 of product sold. Three times the output—three times the wages. A pretty good partnership, man and machine, with everyone benefiting.

No Effective Substitute for Anti-Trust Laws Offered

Attorney-General Mitchell Says Alternative Proposals Would Not Produce Satisfactory Results

IN an unusually frank discussion of the anti-trust laws in an address before the Law School Association of the University of Minnesota at Minneapolis Wednesday evening, April 15, Attorney General William D. Mitchell made it clear that he is indifferent to suggestions for amendment of anti-trust laws authorizing the Federal Trade Commission to consider proposed contracts or mergers and advise business men in advance whether the proposals would violate the law.

"I know of no serious objection to trying such an arrangement," said the Attorney General, "but I confess I am indifferent to it because my experience in the Department of Justice leads me to doubt whether it will accomplish what is expected. As matters stand now, business men who submit proposals in advance to the Federal Trade Commission or to the Department of Justice find out whether their proposals are likely to be the subject of attack by the Government, and, so far as I know, no criminal prosecution under the anti-trust laws has ever been instituted where the men involved had a reasonable ground to contend that what they did received any previous endorsement or approval or was even acquiesced in by these Government agencies.

Doubts Efficacy of Plan Proposed

"My notion is that if the proposal for the Federal Trade Commission to consider these matters in advance and give advisory opinion were put into practice under an amendment to the law, questions would be continually arising whether the things actually done went beyond the proposal submitted and the criminal prosecutions would be, as they are today, not for anything frankly disclosed in advance but for matter developed subsequently. From this point of view the efficacy of the proposal to have such advisory opinions in advance is, to say the least, doubtful."

The remarks of the Attorney General are taken to mean that under proper circumstances advance advisory opinions may be obtained and will afford assurance to those asking for them, but if the principles of the proposals are exceeded legal action will be taken. Moreover, it is evidently the point that court interpretation is always in prospect should differences arise over action taken following such advisory opinions.

The Attorney General said that two aspects of anti-trust enforcement which have stood out during the past two years have concerned activities of trade associations and the problem raised by what he said is the existing overproduction in so many industries related to natural resources.

Dealing with the trade association, the Attorney General said that it is a useful institution and that great numbers of them are serving a useful purpose. Not infrequently, however, it was pointed out, trade associations have been devised and used as a means or pretext for violating the anti-trust laws either through the fixing of prices or suppression of competition. In such cases, the Attorney General declared, the usual method is for some trade association promoter or expert to devise a set of trade association rules, which, separately and individually, seem to be innocuous, and persuade the business men in a particular industry that the scheme is lawful and that there will be no objection from the public authorities.

"In practice these rules may be so used and here and there things done that were not provided for, as to bring about conditions violating the

law, and which go way beyond anything that the organization in its inception pretends to do," said Mr. Mitchell. "It is with cases of this kind that our greatest difficulties arise."

Americans Not Ready for Price Fixing

The Attorney General pointed out that the "air is full of assertion that the anti-trust laws are antiquated and do not fit modern business conditions and they should be revised and amended, but rarely do we find any attempt at a constructive suggestion of a specific change or amendment which could be brought about and produce a satisfactory result."

It was declared that combinations and agreements covering an entire industry and intended to restrict production have the direct purpose and will have the ultimate effect of raising prices. If the combinations are to be permitted, it was stated, the public must have something to say about the prices to be charged. The Attorney General declared he had never been able to discover, and no one has ever been able to suggest, how combinations of this kind may be permitted without forcing the Government into the business of fixing or regulating, or at least in some way determining, the prices to be charged the public.

"While we do regulate the charges made by public utilities, it has not become evident that the people of this country are ready to have an officer or bureau or commission at Washington tell them what they must pay for oil or bread or lumber or other essential commodities," he concluded.

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Coming Meetings May

United States Chamber of Commerce. April 28 to May 1. Nineteenth annual meeting. Atlantic City, N. J. D. A. Skinner, Chamber of Commerce Building, Washington, secretary.

Taylor Society. April 30 and May 1. Spring meeting. Benjamin Franklin Hotel, Philadelphia. R. S. Person, 29 West Thirty-ninth Street, New York, managing director.

National Association of Flat Rolled Steel Manufacturers. April 30 to May 2. Annual meeting, White Sulphur Springs, W. Va. G. H. Charls, Terminal Tower Building, Cleveland, president.

American Foundrymen's Association. May 4 to 7. Annual meeting and exhibition, Stevens Hotel, Chicago. C. E. Hoyt, 222 West Adams Street, Chicago, secretary.

American Gear Manufacturers' Association. May 7 to 9. Fifteenth annual meeting, Hotel Statler, Buffalo. T. W. Owen, 3608 Euclid Avenue, Cleveland, secretary.

American Institute of Mining and Metallurgical Engineers. May 12 and

13. Semi-annual meeting of open-hearth operating men, Stevens Hotel, Chicago. Leo F. Reinartz, Middletown, Ohio, chairman of meeting.

American Society of Mechanical Engineers. May 12 to 14. Fifth national technical meeting of aeronautic division, Baltimore, Md. Calvin W. Rice, 29 West Thirty-ninth Street, New York, secretary.

American Steel and Heavy Hardware Association. May 18 to 20. Twenty-second annual convention, William Penn Hotel, Pittsburgh. Benjamin R. Sackett, 505 Arch Street, Philadelphia, secretary.

American Iron and Steel Institute. May 22. Semi-annual meeting, Hotel Commodore, New York. E. A. S. Clarke, 75 West Street, New York, secretary.

American Refractories Institute. May 25 and 26. Annual spring meeting, Greenbrier Hotel, White Sulphur Springs, W. Va. Dorothy Texter, Oliver Building, Pittsburgh, secretary.

National Foreign Trade Council. May 27 to 29. Eighteenth annual convention, Hotel Commodore, New York. O. K. Davis, India House, New York, secretary.

Wage Reductions Might Stimulate Sales, Says M. W. Alexander

Fallacious to Argue, Says Head of Industrial Conference Board,
That Rates Must Not Come Down



IN an address prepared for the annual meeting of the National Metal Trades Association at Cincinnati, Magnus W. Alexander, president, National Industrial Conference Board, discussed the possibility of wage reductions as a means of increasing business volume. Mr. Alexander was not present to deliver the address at the convention, but a summary of his intended remarks was given out by the Conference Board's publicity department.

"It is fallacious to assume," said Mr. Alexander, "that by building a Chinese wall around wage rates it will be possible to ward off the necessity of general economic readjustment in time of depression. It is even more fallacious to argue that wage rates must be maintained despite reductions in the cost of living, in order to protect the standard of living of American wage earners. It is after all not the money wage but rather the real wage, represented by the purchasing power of money earnings, that determines whether living standards can be maintained. When therefore the cost of living falls a proportionate reduction in wages need not affect adversely the economic status of the worker. This fact is generally ignored in the current discussion of the wage problem.

"The other vital consideration, which is also generally overlooked in this discussion, is the paramount part that hours of work each week play in the proposition. The facts show that at present not only are millions of usually employed persons altogether deprived of work, but that several more millions are working on short time. In consequence, even though the high wage rates of 1928 and 1929 have been maintained in most of the large, and in many small, establishments throughout the country, the partially employed workers in these establishments have suffered a considerable reduction in their weekly wage incomes and therefore in their purchasing power and economic status.

Moderate Wage Reductions Might Increase Employment

"The question naturally arises," continued Mr. Alexander, "whether moderate wage reductions, not larger than the decline in the cost of living,

might not permit longer weekly working schedules with larger payments in the weekly pay envelopes. The reasoning implied in the question is that reduced production costs, on account of the lower wage factor, would result in lower sales prices and therefore stimulate increased buying, greater industrial activity and consequent larger employment. Besides, lower prices would give this country a better chance in world trade.

"The question here raised cannot be answered categorically. The size and the financial strength of individual establishments and similar factors must be taken into account. Large enterprises with substantial reserves

and flexibility in their work arrangements may be in a position in which they can afford to maintain wage rates and at the same time provide normal, or nearly normal, employment. The average smaller enterprise, however, may of necessity have to make adjustments in wages, as well as in other expenses, in order to be able to continue to operate at all. When such adjustments cannot be avoided, it is obviously in the interest both of the employing concern and its employees that they be made, but they should then be made in a way that will least disturb the economic mechanism and the industrial relationship."

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Georgia Manganese Plant Transferred This Month

Formal transfer of properties of the Georgia Manganese & Iron Co., near Cartersville, Ga., will be made about April 28. A reorganization committee of the bondholders bid in the properties at a recent public sale, and the bid has been confirmed by the court. Following transfer to the new ownership, an agreement for survey and development of the property is planned with E. J. Lavino & Co., Philadelphia, who are associated with the reorganization committee.

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Trade Commission Favors Simplified Practice

WASHINGTON, April 21. — Federal Trade Commission has officially given its approval to simplified practice recommendations drawn up by members of an industry in cooperation with the Department of Commerce. The commission regards the work of the department in encouraging standardization as important and beneficial to the public.

The position of the commission was set forth in a letter from C. W. Hunt, chairman of the commission, to the Secretary of Commerce. Mr. Hunt's letter was in response to a

communication from Mr. Lamont, which was prompted by letters to the department from officials of several trade associations, who had gained the impression from published reports that the commission was about to rule adversely on the subject of simplified practice recommendations.

Dr. George K. Burgess, director of the Bureau of Standards, in commenting on the letter from Chairman Hunt, strongly supported simplified practice programs. He pointed out that they are concerned only with the simplification or standardization of commodities of particular industries and are not in any way concerned with the methods by which these commodities are distributed or sold. Dr. Burgess added that the courts have not only never taken any exception to these activities, but have approved them as being admittedly beneficial to an industry and its customers.

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Ford, Bacon & Davis Construction Corp. has been formed as a wholly-owned subsidiary of Ford, Bacon & Davis, Inc., to handle all contract construction activities for the entire organization. The new company will have executive offices at 39 Broadway and field offices at Dallas, Tex. Officers are: Edgar G. Hill, president; James F. Towers and William von Phul, Jr., vice-presidents, and Henry F. Storck, secretary and treasurer.

New Designs in Materials-Handling Equipment Featured in Exposition

HANDLING equipment in latest designs and various types comprised a large and highly instructive exhibit at the second Industrial Equipment Exposition held in connection with the National Industrial Congress at the Public Auditorium in Cleveland last week. There were over 100 exhibitors of materials-handling equipment, plant-maintenance materials, power-transmission equipment and requisites for factory operation.

Electric and hand hoists, monorail systems, cranes, power-driven trucks and elevators of latest types were shown by many manufacturers, as well as minor handling equipment, such as hand trucks, skid platforms and containers of various types. The display included handling equipment of about every character for effecting economies in plant operations. Several types of speed-reducing units were shown. The exhibit included also weighing and counting scales, electric time systems, roller bearings, steel partitions, motors, belting and various other equipment used in plant operation and maintenance.

Various improvements and refinements in mechanical handling equipment were indicated by the displays. Electric hoists showed a tendency toward higher speeds, lower head room, better types of control, better lubrication and fewer points of lubrication. Greater efficiency and increased flexibility in monorail systems have been brought about by various improvements.

The exhibit attracted much interest and favorable comment. While the attendance was not so large as hoped for, the visitors for the most part were factory executives who were keenly interested in the equipment and many of the exhibitors developed good sales prospects.

Flexibility in Monorail Construction

An interesting new development in the construction of a monorail system designed to increase flexibility and efficiency was displayed by the American Monorail Co., Cleveland. This was a booster system connected with a monorail track. The booster sections are operated by continuous chain drive, which carries the trolleys up an incline to a point from which they move on to a gravity section of the monorail. At the front end of the booster track is an adjustable brake and automatic escapement, so that only one trolley is picked up by the booster at a time. Trolleys are finally returned to their starting point. The operation of the system may be reversed for lowering loads. The use of the system permits the

monorail to be raised to the ceiling and out of the way of aisles.

A continuous trolley conveyor, electric transfer bridges and cranes, motor-operated switches, electric grabs, tramrail carriers and scales were included in an extensive display of conveying equipment made by the Cleveland Electric Tramrail division of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

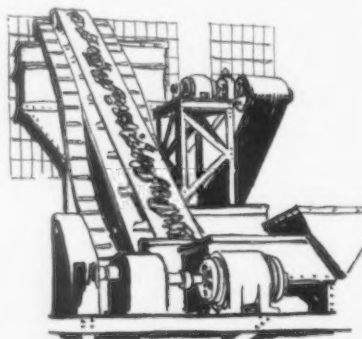
A swivel trolley designed for use on curves with short radius was shown by the Richards-Wilcox Mfg. Co., Aurora, Ill. A one-ton, 4-wheel trolley of the swivel type, it is stated, can run on a 2-ft. radius curve. As a new safety feature in crane construction, a crane was shown with a rubber guard to protect the electric conductor. Push-button control for electrically operated switches, and an interlocking transfer crane with a safety stop, also were exhibited by this company.

Extremely low head room is an important feature of a new hoist made in $\frac{1}{2}$ to 2-ton capacities exhibited by the Euclid Crane & Hoist Co., Euclid, Ohio.

Lift Trucks for Special Purposes

The recent tendency in the design of electric trucks has been toward units of greater capacity. However, its small size was a feature of a new lift truck exhibited by the Elwell-Parker Electric Co., Cleveland. This is only 29½ in. wide, permitting it to be operated through 4-ft. aisles and narrow doorways. Its height is only 87 in., allowing it to go into box cars. Its capacity is 3000 lb.

Considerable interest was shown in a new type of light electric truck for light and rapid service, just brought out by the Custer Specialty Co., Inc., Dayton, Ohio. This, designated as a utility car, is made in capacities of 400 to 800 lb. The smaller weighs 600 lb. and the larger 900 lb. It has a speed of 2½ to 10 miles an hour, and is designed to fill the gap between the hand-pushed truck and larger electric trucks.



A new telescoping high-lift truck with a lift of approximately 9½ ft. was included in the exhibit of the Baker-Raulang Co., Cleveland. This will be made in 3000 to 5000-lb. sizes.

An aluminum chain hoist was a new product shown by the Chisholm-Moore Hoist Corp., Tonawanda, N. Y. This was described in *THE IRON AGE*, issue of April 9.

A gas-electric power plant for electric trucks, using a Ford Model A motor, was exhibited by the Ready-Power Co., Detroit, which recently brought out this unit. Another new oil, gas, electric power plant for electric trucks was shown by the Universal Power Co., Cleveland.

Portable Crane Has Electric Lift

A new portable crane with electric lift with 3000-lb. capacity was shown by the Lewis-Shepard Co., Boston. A new feature of a hand truck displayed by this company is that the platform has a foot lift instead of being raised by hand.

A new design of electric elevator for handling tote boxes between floors was exhibited by Samuel Olson & Co., Inc., Chicago. This has an electric kick-off, permitting the boxes to be discharged to any floor. It is made for handling tote boxes of any capacity up to 400 lb.

A new method of driving a live roller conveyor around a curve was shown in the exhibit of the Standard Conveyor Co., North St. Paul, Minn. The rollers for curves are cone shaped on the driving end, and are driven by a V-shaped belt that contacts with the cones. The drive eliminates noisy gearing. A new method of diverting tote boxes from a roller conveyor was shown also. With the system a box may be discharged from the conveyor at any one of 22 stations.

Light Metals Featured

Crane controllers having housings with aluminum end plates were shown by the Euclid Electric & Mfg. Co., Euclid, Ohio. Heretofore both the end plates as well as the backs of the housings have been of steel, but the lighter metal has been substituted for the end plates to reduce weight.

Exhibits of skid platforms included one made of aluminum just brought out by the Youngstown Pressed Steel Co., Youngstown, Ohio. This skid is about 60 per cent lighter than a steel skid and, in addition to the saving in weight, an advantage claimed for it is its resistance to corrosion.

Rubber lining of steel containers recently has been an apparently promising field of development and this has extended to dump hoppers. A rubber-lined hopper for handling acids, alkalis, salts and abrasive material was shown by the Roura Iron Works, Detroit.

Designed to eliminate noise and vibration, a new speed reducer was shown by Gears & Forgings, Inc., Cleveland. The feature of this is

that it has double pitch and double helical gears. The pinion is fixed. It is made for both single and double reduction.

A counting and weighing machine for counting small parts by weight was shown by the International Business Machines Corp., New York. This automatically counts and shows the count in figures on a chart. This company also exhibited electric tabulating and accounting machines. Included was a new machine designated as an interpreter, for automatically making a record in printed figures on a man's time card, of the information contained in holes punched on the card. The card punching is done in one of the other machines.

Electrochemists to Meet at Birmingham

The twenty-ninth annual convention of the Electrochemical Society will be held at Birmingham this week, starting Thursday. There will be four sessions: The first on "Ceramics" will deal with the application of electrochemistry to the manufacture of porcelain, glass, carborundum and other refractories. The second session will be devoted to "Electronics," which includes the radio tube art. O. S. Duffendack and R. A. Wolfe of the University of Michigan, together with D. A. Randolph of the A.C. Spark Plug Co., Flint, Mich., have developed a nickel-barium alloy giving a very constant sparking voltage. The alloy is a strong electron emitter

which makes it very valuable for spark plugs and many other electrical devices.

The final session, on Saturday, April 25, will be presided over by Prof. A. Kenneth Graham of the University of Pennsylvania, and will be concerned with the electrodepositing of metals and alloys. W. Keitel and H. E. Zschiegner of the Baker Platinum Works, Newark, N. J., will describe the new art of platinum and palladium plating. Prof. S. Glasstone of Sheffield, England, will report upon the plating of the noble metals in England. Dr. Harold K. Work and Charles J. Slunder of the Research Laboratories of the Aluminum Co. of America will demonstrate how hard, corrosion-resistant chromium may be plated directly on aluminum, thereby protecting the aluminum against ordinary abrasion and alkali corrosion. Ernest R. Canning of Birmingham, England, will describe the high-speed nickel plating process used in England. How tungsten, the metal composing the filament of the incandescent lamp, may be electroplated on brass and other metals will be revealed to the public for the first time by Prof. Colin G. Fink and Dr. F. L. Jones of Columbia University.

Electric Hoist Orders Up Nearly 30 Per Cent

Members of the Electric Hoist Manufacturers Association report that the number of hoists ordered during

March increased 29.94 per cent, compared with the previous month, and the value of such orders increased 7.69 per cent, compared with February, 1931. Shipments were 25.66 per cent greater in March than in February.

Crucible Steel Co. Is Operating at 50 Per Cent

Horace Wilkinson, chairman of the Crucible Steel Co. of America, at the annual meeting of stockholders said:

"We are now operating at about 50 per cent of capacity. Our business for the first quarter of 1931 was about 50 per cent of that of the corresponding period of 1930. However, it showed a gain of 10 per cent over the last quarter of 1930. Crucible cannot make money on a 50 per cent operating rate. We will just about have an even break. We would have to operate at a rate of 75 to 80 per cent to cover our usual common dividend obligations. At 50 per cent we cannot cover preferred dividends.

"However, we are moving forward, and if this improvement is permanent," Mr. Wilkinson continued, "we look forward to resuming our common dividends. To date it would indicate we would hold our own this quarter, a gain having been shown for the first two weeks of April.

"Prices in some lines are lower and are holding in others. Carbon and alloy steel prices are off, but crucible steel prices are holding."

RUSTLESS STEEL PRODUCTS IN WINDOW DISPLAY



A GROUPING of products manufactured from rustless steel in an exhibit of the Crucible Steel Co. of America, which was part of a recent extensive industrial exhibit in the windows of Gimbel Brothers store in Philadelphia.

Handling Bulk Material and Automotive Machine Shop Products

THREE papers were listed for presentation Friday afternoon at a materials-handling session at which Warner Seely, secretary, Warner & Swasey Co., Cleveland, was presiding officer and Matthew W. Potts, Alvey Ferguson Co., was chairman. "Handling Bulk Material Mechanically" was the title of a pre-printed paper prepared by W. W. Sayers, Link-Belt Co., Chicago, in which the subject was covered very thoroughly. In Mr. Sayers' absence the paper was abstracted by Paul Wheeler of the same company, who presented lantern slides showing various types of installations for handling bulk materials.

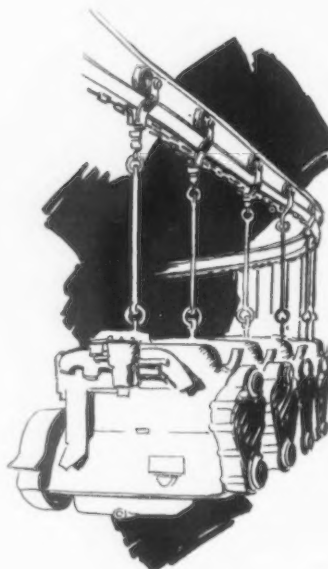
The paper classified these units as belt conveyors, skip hoists, trolley buckets, screw, apron, flight, drag and chain and bucket conveyors and power hoes. Descriptions were given of the various types, as well as other equipment for handling coal, coke and other commodities. The author dwelt on the extensive use of conveying equipment in foundries and the economies effected by the use of conveyors for handling metal, molds and foundry sand.

Mr. Wheeler declared that remarkable strides have been made in the past few years in the efficiency of belt conveyors, through the use of anti-friction idlers.

Portable Belt Conveyors

IN a paper on uses and application of portable belt conveyors, J. B. Bray, Fairfield Engineering Co., Marion, Ohio, pointed out the versatility and numerous uses for portable conveyors. These conveyors, he said, are built in two principal types, those of the endless belt and those of the flight or scraper type, the latter being more generally termed drag conveyors. Those of the endless belt type, he said, have the widest application, as they may be used in handling almost all classes of loose bulk materials, and also can frequently be used to advantage in handling materials in packages and boxes.

Portable belt conveyors, he said, are usually recommended for use in handling materials where conditions do not justify the use of permanent material-handling equipment. Conveyors equipped with troughing type belts or with troughing type idlers are generally recommended for handling loose materials, while those with flat belts



are usually preferred for handling bags and packages.

The author referred to various interesting installations of portable belt conveyors. One is being used by a Michigan plant for loading finished automobile jacks into box cars. It is stated that its use has cut the loading time in half and reduced the size of the loading gang by one-third.

A pipe manufacturing plant in Pennsylvania uses two 40-ft. portable belt conveyors for unloading fuel and foundry sand and for loading steel scrap into railroad cars. An Illinois foundry, with the use of a short belt conveyor for reclaiming sand from the foundry floor to a conditioner, has cut the time required for this operation from 5 hr. to 1½ hr.

Reference was made to various installations of drag type conveyors for handling coal at power plants. The speaker said that, where portable conveyors are used for unloading bulk materials from hopper bottom cars, the operating cost for power and labor will not exceed 5c. a ton. In conclusion, he characterized a portable conveyor as a highly useful tool when properly applied, but pointed out that such conveyors necessarily cannot properly be made to serve every material-handling requirement.

Equipment Used in Large Machine Shops

HANDLING of materials in automotive machine shops was discussed by N. H. Preble, Jervis H. Webb Co., Detroit. Material handling

in these shops, he said, is similar to handling work in other machine shops where production is large enough to warrant the use of conveying equipment. The primary saving of conveyors is in non-productive labor, but that is not the only function.

Large Savings Reported

Advantages of the use of conveyors in machine shops, he pointed out, include increase in efficiency of productive labor and machines, decrease in inventory in process due to proper handling, decrease in floor space, due in part to reduced inventory, decrease in damage to work in some cases, more orderly shops and pace making. While one conveyor is not a pace maker, he said, if the whole plant is properly laid out, the conveying equipment can be made to serve as a mechanical pace maker, which he declared to be an important advantage.

The speaker classified conveying equipment in machine shops as intermittent or continuous and with a fixed or flexible path. Electric trucks come under the intermittent and flexible classifications.

Mr. Preble illustrated his talk with lantern slides showing various installations and types of conveyor equipment. One group of pictures showed an interesting series of conveyors used in the Toledo plant of the Chevrolet Gear & Axle Co. for handling work in process and providing a steady flow of material for each operator. Another conveyor takes the finished transmissions to the shipping dock.

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Pfanstiehl Chemical Co., Waukegan, Ill., is appointing local representatives throughout the country to represent that division of its business which manufactures and markets soldering pastes, salts, sticks, liquids and solid sal ammoniac. One of the recent appointments is Wood & Anderson, 915 Olive Street, St. Louis, for southern Illinois, Missouri, Iowa, Kansas and Nebraska.

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Sheet Piling, Inc., and Steel Union Co., Inc., American representatives of the United Steel Works Corp. of Germany, which have been located at 17 John Street, New York, since 1927, are moving on April 10 to the New York Evening Post Building at 75 West Street.

Agitation for Wage Reductions Finds Administration Opposed

Spokesmen for Government at Washington Urge Continued Maintenance of Basic Rates of Pay

By L. W. MOFFETT



WASHINGTON, April 21.—With sharply conflicting views finding expression, Washington is sharing in the widespread discussion of prospective wage reductions. Not until the past two weeks has there been a marked tendency to break from the tacit agreement generally adopted to avoid the subject, except in an incidental way. But with business recovery more dilatory than had been expected, means of meeting the situation are being given greater scrutiny and suggestions of wage cuts have come to the front.

The situation is unprecedented in the history of American economics and industry. In the past one of the initial moves in periods of depression was to reduce wages. Subsequently there developed a school of thought that maintenance of high wages is necessary to sustained purchasing power. Experience is held to have justified the direct relationship. Yet, with diminishing markets and downward prices, leaving little or no margin over costs, stern realities have forced recognition of the fact that there are limitations to the contention that high wages make prosperity. In consequence, greater voice is being given to the point that prosperity makes high wages. Wider employment at less wages per day, it is contended by some, will reflect more real wages and prosperity than restricted, part-time employment at high rates.

It is this conflict of views around which centers the intensified attention regarding wages and employment. Determination of the question as to whether further wage reductions will or will not be made apparently resolves itself into the failure or success of a substantial upturn of business in the near future.

Slow Recovery a Disappointment

The slowness of business revival has been a disappointment, heightened by earlier optimistic forecasts that were not realized. They gave way to more moderate and cautious prophecies. Now, however, there has risen more discussion regarding both the necessity of wage reductions and claims that "business actually has turned the corner and is on the upgrade," and that wages should be maintained.

Among those sharing the view that business is improving is Roger Babson, economist, who conveyed this cheering message to President Hoover

in an interview at the White House last Thursday. Secretary of Labor William N. Doak has reported that industrial employment had increased substantially since January. He announced that 152,000 more persons were employed in manufacturing in March than in January and that the aggregate weekly payroll increased \$13,500,000, and was proportionately greater than the increase in the number of employees, "meaning a greater percentage of full time work."

Mr. Babson is understood to have emphasized to the President the outlook regarding Federal, State and municipal building programs. It is his opinion that these programs will not be in full swing until summer, and possibly not until fall. Prevailing improvement, however, was reported in such activities as car loadings and retail sales. He even said he would not be surprised to see a shortage of labor in some lines before the end of the present year. The prosperity period, in the opinion of Mr. Babson, bred "softness," but now "a new and virile leadership is making itself felt in business." He predicted a continued decline in commodity prices, but added that "there are a good many things like sugar, lead, wheat and copper that are below the cost of production" and have struck bottom. He offered the view that the next era of speculation will be in commodities instead of stocks, feeling that the "people are fed up on stocks." The country's business troubles will be over, in his estimation, if there is enough rain to insure good crops. Mr. Babson did not discuss wages in talking to the press, and it is not known whether the subject was discussed with the President.

Administration Still Urging Wage Maintenance

Should it be true that business actually has started on the upgrade, it may well be expected that the administration will be successful in urging maintenance of wages. This was one of the chief points projected at the conference of the President and business leaders in December, 1929. The principle was strongly supported by a majority of his conferees, including prominent steel manufacturers. It is still being stoutly urged by them. Whether justified or not, a great deal of criticism has been directed to certain banking interests as being the

chief proponents of wage reductions. Some of them have publicly resented the charge.

The fact remains that up to the present industry has done remarkably well in maintaining wage rates, though reduction in employment and "staggering" of work has been found necessary. That wage decreases have been kept at a low point so far is indicated by monthly reports received by the Bureau of Labor Statistics, Department of Labor, from 13,000 establishments. Such as they were, reflection of wage decreases began to become most noticeable in December of last year. Yet for the three-month period, Dec. 15, 1930-March 15, 1931, the total number of establishments reporting wage decreases was 738. Of these 118 or 16 per cent were in the so-called iron and steel group. This group is classified as follows: Iron and steel; structural ironwork; foundry and machine shop products; hardware; machine tools; steam fittings and steam and hot water heating apparatus and stoves. Taking iron and steel (manufacturing plants), foundry and machine shop products and machine tools, with an average number of 1420 reporting establishments, the bureau's records show 66 reductions.

These plants consisted of 14 in the average number of 195 reporting iron and steel plants; 47 in the average number of 1077 reporting foundry and machine shop plants and five in the average number of 148 reporting machine tool plants. The average wage cut in iron and steel plants was 7.4 per cent; in foundry and machine shops, 10.3 per cent, and in machine tool plants, 10.9 per cent. The total number of employees affected was only 9674, made up of 5927 in iron and steel; 3536 in foundry and machine shops and 211 in machine tools. The returns as to iron and steel would indicate that the decreases applied to the smaller units, not the larger ones.

It is known that the attitude of industry generally in keeping up wages has been a source of gratification to the administration. Organized labor, through President William Green of the American Federation of Labor, has approved the general policy of industry. He said that the transportation, building, steel and automobile industries are observing their pledge to the President not to lower wages.

He declared that wage cuts have occurred chiefly in the textile, boot and shoe and bituminous industries.

That the administration is seeking to prevent wage cuts is reflected in a number of ways. One indication apparently was through an address on "Constructing Prosperity" recently broadcast by Dr. Julius Klein, Assistant Secretary of Commerce. Holding that more jobs are the key to business recovery, he warned against wage cuts. He declared that the "vast majority of our industrial leaders are keenly appreciative of the necessity of providing at least some work for the maximum number."

Calls Wage Reduction Short-Sighted

Then turning to the matter of wages, he said:

"Most of them realize, furthermore, the grave perils that lurk in the short-sighted proposal of the wage cut. Let us not add strikes and other industrial disorders to our troubles. We have enough grief as it is. That is what was done in 1921 when wage cuts started the greater part of the 2400 strikes in that depression and turned more than 1,000,000 workers out into the streets. One dose of that kind of dangerous nostrum ought to be enough in our depression experience. We need more jobs, not less; and we need them not after a lot of cumbersome political maneuvering, not next year, or next winter, but right now."

Ethelbert Stewart, Commissioner of Labor Statistics, is of the opinion that both maintenance of wages and regularity of employment are necessities for sustained prosperity. One of the obstacles to regular employment, Mr. Stewart thinks, is the Sherman anti-trust law. To regulate employment at a maximum of efficiency, he says, means the squeezing out, or the squeezing in, of two-thirds of the establishments of the country in practically every line of endeavor.

"The squeezing out which is now going on is brutally cruel, inhuman and most expensive," Mr. Stewart stated. "A squeezing-in process would require the repeal of the Sherman anti-trust law, or such modification of it as would enable us to bring our intelligence to bear upon problems without a threat of the penitentiary." He indicated that practically all of the industries contain a few firms which have been able not only to maintain but to increase employment in 1930.

"It ought to be possible, without danger of arrest under a United States Department of Justice warrant, to bring the intelligence of these employers to bear upon the activities of the industry as a whole."

It is the contention of Mr. Stewart there ought to be permitted the intelligent organization of an industry which plans for a stabilized relationship between production and consumption and for a stabilized employment of labor so as not to affect price unreasonably.

"Taking the iron and steel industry as a whole there was a decrease of 16.6 per cent in the number of workers on the payroll in October, 1930, as against the same month in the year before," said Mr. Stewart. "Yet of the firms reporting employment to the Bureau of Labor Statistics, 16 reported an increase in employment as between these two months; four reported no change whatever, while 127 reported a decrease. But the variation in the percentage of change is even more astounding than this. Of the 16 firms reporting an increase, the increase ranges all the way from 1 to 142 per cent, and two very large plants succeeded in increasing their employment by 4 per cent and 13 per cent, respectively. Again, among the firms reporting a decrease, the diminution ranges from 1 to 91 per cent, with five actually closing down."

Excess Plant Capacity a Problem

Mr. Stewart explained that, in any proposed readjustment which will regularize employment in the sense of steady work for 300 days in the year, "we immediately face our most serious situation—that is the excessive capacity within the industries." Citing one instance, he said American cement mills have a developed capacity for 260,000,000 bbl. of cement a year. The present demand was said to be 150,000,000 bbl., leaving 70 per cent more capacity than demand. He pointed to the bituminous coal industry as what he called "the most horrible example."

Mr. Stewart joins with other Government officials in strongly opposing wage reductions and approves of the stand of industrial leaders who take this stand, but, on the other hand, is critical of some bankers who, it is claimed, are back of the agitation for wage reductions.

Leading minds in industry and the

economic world, Mr. Stewart said, are in favor of high wages, but he added that the real menace right now is the attitude of some of the bankers who "are thinking in the terms of the political economics of Adam Smith and are not getting away from it. The manufacturers are."

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National Steel Earnings 89c. a Share in Quarter

The first steel company to make public its earnings for the initial quarter of 1931 is National Steel Corp., which reports that it earned substantially more than its common dividend in that period.

Net earnings after depreciation and depletion, available for interest, were approximately \$2,620,000 for the first quarter of 1931, or more than 4.8 times the interest requirement on the company's funded indebtedness presently to be outstanding, including the \$40,000,000 of first mortgage 5 per cent bonds recently offered by the National City Co. and the Bankers Trust Co. Net for the same period of approximately \$1,926,000, after all charges and Federal tax, was equivalent to 89c. a share on the common stock, compared with the 50c. quarterly dividend requirement, Ernest T. Weir, chairman of the board, has announced.

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Merger Ratified

A merger of the Reliance Mfg. Co., Massillon, Ohio, with the Eaton Axle & Spring Co., Cleveland, was ratified by stockholders of the former company at a meeting on April 20. Eaton Axle will exchange five shares of its stock for each four shares of Reliance.

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New Austrian Tube Mill

HAMBURG, GERMANY, April 9.—Construction of the first steel tube mill in Austria has been started near Vienna by Felten & Guillaume, one of the leading German makers. The capacity of the new mill is expected to be 25,000 tons annually.

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Stockholders of Detroit Seamless Steel Tubes Co., Detroit, at the annual meeting April 14, heard a report from C. H. Hobbs, president and general manager, that 1930 had been a profitable year for the company and that each month in 1931 had shown an increase over the preceding month.

Footo Brothers Gear & Machine Co., Chicago, has removed its general offices from 111 North Canal Street to 215 North Curtis Street.

Establishments in Iron and Steel, Foundry and Machine Tool Industries Reporting Wage Decreases

Dec. 15, 1930-March 15, 1931*

Industry	Average Number Establishments Reporting	Number Reporting Wage Decreases	Average Per Cent Decrease	Number Employees Affected	Average Per Cent Employees Affected†
Iron and steel.....	195	14	7.4	5,927	72
Foundry and machine shop products.....	1,077	47	10.3	3,536	80
Machine tools.....	148	5	10.9	211	98

*Composite tabulation based on reports to Bureau of Labor Statistics, Department of Labor.

†In the plants making decreases.

Pension Plan of U. S. Steel Ratified by Stockholders

Annual Meeting Hears Report on Profit-Sharing and on Progress of the Company

RATIFICATION of the new pension plan, discussed in these columns last week, a statement covering the bonus or profit-sharing plan affecting the major executives, and the financial showing of the United States Steel Corp'n. for the last three years, featured the annual meeting of the stockholders of the corporation held at Hoboken, N. J., April 20.

As regards the pension plan, including its upward change of rates and its provision for compulsory retirement, President Farrell termed it the greatest thing respecting welfare that had yet been done by the corporation. The profit-sharing plan is referred to on page 1379.

As to the consolidated figures of the finances for the three years, it was shown that the net profits for the period amounted to \$416,187,406. The dividends paid, representing 60 per cent of the earnings, totaled \$249,687,513. There was accordingly a net surplus for the period of \$166,499,893.

Mr. Farrell told how the capacity of the corporation had expanded from 7,000,000 tons of ingots when the corporation was formed to 28,000,000 tons today. He dwelt on the substantially complete rebuilding of the plants of the National Tube Co. at McKeesport and of the Illinois Steel Co. at South Chicago, with facilities for making every kind of pipe at the one place and for producing alloy steels in the finest plant of the kind in the world at the other. He added that if a little better rate of operations can be realized at present steel prices, "we will have a reasonably good year."

Division of Work Among Employees

What the corporation has been doing to effect an equitable distribution of work to as many employees as possible was told by Myron C. Taylor, chairman of the finance committee. Upward of 96 per cent of the normal working force of 241,000 were on part or full time in the last half of March. There were 79,000 on full time and 145,336 on part time.

Since Oct. 1, the corporation has spent approximately \$700,000 for those for whom work could not be obtained and in contributions to unemployment relief funds. Mr. Taylor added that so far as he was aware not a single employee of the corporation was in want.

In bringing the meeting to a close, Mr. Taylor declared that "the stimulation which adversity has given to our efforts to reorganize and improve our industrial structure is very great.

We have been passing through some tribulation, but if we emerge from the testing period with improved efficiency and more highly developed productive and economical methods of operation, our tribulation will not have been in vain."

Mechanical Engineers Meet

BIRMINGHAM, April 21.—The council of the American Society of Mechanical Engineers decided that the next semi-annual meeting will be held at Bigwin, Ont., June 27 to 30, 1932.

A student branch was granted the University of Alabama.

A committee on air purification was authorized.

The council voted to have the society join with the American Society for Testing Materials in a session on the properties of materials at high temperatures, to be held at the A. S. T. M. meeting in Chicago in June.

Registrations this morning for the semi-annual meeting now in progress totaled about 350.

The increasing role of metallurgy in the mechanical engineering of railroads was discussed at length and a dispatch reviewing this will be found on page 1392.

Eastern Steel Co. Plant Sold to Luria Brothers

At public sale of plant and properties of the Eastern Steel Co., Pottsville, Pa., April 20 and 21, by Samuel T. Freeman & Co., auctioneers, Philadelphia, a high bid of \$512,500 was submitted by A. L. Luria of Luria Brothers & Co., Reading, Pa., dealers in iron and steel scrap. The bid consisted of \$500,000 offered for all buildings, equipment and real estate covered by the first mortgage bonds, and \$12,500 for material in stores. This was in excess of the aggregate bids submitted later on the plant, equipment and materials offered in separate parcels.

Included in the materials at the plant was about 5000 tons of new steel products, on which 1.10c. a lb. was bid on the beams and channels, 1.20c. on angles, 90c. for a tonnage of steel bars and 85c. a lb. for billets. The buyer also paid 33c. a 100 lb. for steel scrap on the plant's yard and 50c. a ton for about 2000 tons of coal.

When the qualifying deposits of

bidders were filed on Monday with Roland Morris of Duane, Morris & Heckscher, Philadelphia, the master, it was disclosed that A. L. Luria was the recent purchaser of the \$1,800,000 of Eastern Steel Co. bonds at \$208,800, and an additional \$40,000 compensation to the bondholders' committee for services over a period of years. While the bidder will be obligated to pay in cash for the material in stores, it is understood that the purchase price of the plant, equipment and real estate may be satisfied with the bonds. Of the cash received for stores, about \$150,000 will be required to pay off receiver's certificates, and any remaining cash will be available to pay off the creditors and satisfy the bonds. This is understood to represent about 16c. of every remaining dollar for creditors and 84c. for the holder of the bonds.

The plant was closed by the receiver on Feb. 28, and the new owner has not yet announced whether the plant will be scrapped or resume operation. However, in view of the purchase price involved, it is said that it may be the intention of the buyer to resume operations rather than to seek a profit in dismantling the plant for its scrap value.

Gear Makers to Meet in Buffalo

A comprehensive program of commercial and technical discussion has been planned for the fifteenth annual meeting of the American Gear Manufacturers Association, which will be held at the Hotel Statler, Buffalo, May 7, 8 and 9.

Included is an address on the "Strength and Durability of Spur Gear Teeth," by Prof. Earle Buckingham, professor of engineering standards, Massachusetts Institute of Technology, Cambridge, Mass., and an address on "Non-Metallic Gears and Their Operating Characteristics," by C. W. Mansur, plastics department, gear division, General Electric Co. Speakers at the informal dinner planned for Friday evening, May 8, include R. W. Lindsay, vice-president of Pratt & Lambert, Inc., Buffalo.

T. W. Owen, 3608 Euclid Avenue, Cleveland, is secretary of the association.

Alloy Metal Wire Co., Inc., Moore, Pa., has appointed W. W. Wilson, General Motors Building, Detroit, and Metal Parts & Equipment, Inc., 4950 Washington Boulevard, Chicago, as agents for its nickel and nickel alloys for electrical resistance, stainless steel cold-rolled strip and cold-drawn rod and wire.

The thirteenth exposition of Chemical Industries will be held at the Grand Central Palace in New York during the week of May 4.



Improvement in Retail Motor Car Sales Encourages Automobile Industry

DETROIT, April 20.

THERE has been an encouraging improvement in automobile retail sales this month. The gain in public demand became noticeable in March and is illustrated by last month's showing of General Motors, which sold through its dealers 101,339 cars, representing an increase of 47 per cent over February. March deliveries to dealers totaled only 98,943 cars. This is an example of how closely manufacturers are attuning production to actual sales.

The progressive betterment of retail orders is supported by the experience of the Chevrolet Motor Co. In the first 10 days of March its domestic sales were 17,224 units, in the next 10 days 24,910, and in the final 10-day period 31,494, or a total for the month of 73,628 units. Although figures are not yet available for the early days of April, they are said to have continued this upward movement. Chevrolet dealers' new car stocks were reduced 6500 units in March and used car stocks 5000 cars.

The Ford Motor Co. and other important makers are understood to be gratified at the upswing in retail trade. Naturally, comparisons with last year are unfavorable, but automobile executives are not inclined to attach too much significance to that fact. They are more interested in the revelation that sales of many companies showed a relatively higher gain in March over the preceding month than in 1930, and that there are indications that medium-priced cars are regaining some of the ground lost last year.

Not Venturing Forecasts for May

APRIL is still counted upon for 330,000 to 350,000 units. Manufacturers are not venturing predictions for May, although the outlook at the moment points to a continua-

tion of the current rate. June is uncertain, but here again the industry believes that output should be fairly well sustained. As a peg on which to hang hopes, the industry has set for itself the task of making 1,000,000 cars in the second quarter. Unless there should be an unexpected reversal of the present trend, it should not fall far short of its goal. On the assumption that it may attain it, the total for the first half would be slightly under 1,700,000 units. That would be 600,000 cars below the same period of 1930.

Twenty-Millionth Ford Produced

HENRY FORD drove the twenty-millionth Ford off the assembly line at the Rouge plant on April 14.

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Production of motor cars in second quarter may reach 1,000,000 units, giving a total for the first half of 1,700,000 units or 600,000 less than in 1930.

* * *

General Motors dealers sold 101,339 cars in March, whereas factory deliveries to dealers totaled 98,943 cars. This shows how closely manufacturers are attuning production to actual sales.

* * *

Upswing in retail sales, aided by favorable weather, encourages the industry.

* * *

Canadian plants of American automobile companies are to make cars for export to European plants and to British Empire.

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After a tour of the country, it will be placed in the Ford museum at Dearborn. The first-millionth Ford was produced in December, 1915; the two-millionth in June, 1917; the five-millionth in May, 1921; the ten-millionth in June, 1924, and the fifteen-millionth in May, 1927. It is estimated that there are well over 4,000,000 model T Fords still in operation, whereas model A has not yet reached the three million mark. Some observers have figured that in 1936 there will be more than 750,000 model T cars in operation. Thus model T replacement parts business will continue to be attractive for some time.

General Motors complete price list at present is said to include 113 different models in seven distinct lines ranging from \$475 to \$9700, at the factory. In the past year the price spread has been increased \$20, but the number of standard models has been reduced by 24. There is less overlapping than formerly; except for a higher-priced Oakland and a high-priced LaSalle, this fault has been eliminated.

Canadian Expansion Significant

THE full significance of the swing of American automobile manufacturers toward production in Canadian plants instead of exporting cars to Canada from the United States has scarcely been realized. While the Canadian market in itself is worthy of considerable effort, it is becoming increasingly evident that companies with Canadian manufacturing facilities intend to use them to supply European countries and the British Empire. Ford of Canada has long furnished Fords for all of the British possessions outside the United Kingdom. It is understood that General Motors also has pursued this policy, at least for some of its lines.

Now Reo states that its Canadian subsidiary is to make cars for shipment to Europe. It is expected that other companies will follow this method, as the tariff on Canadian-made goods in many countries is not nearly so high as on American goods which are subject to heavy duties as a retaliatory measure against the present tariff of the United States.

Observers point out that the automobile industry would not rush to invest capital in Canadian plants, at a time when its conservatism is a subject of comment, unless it is convinced of the long-time worth of such a move. Some steel men close to the automotive situation see a substantial loss in tonnage to American steel mills, as it is not unlikely that the Canadian Government will foster the growth of the steel industry at home by imposing a high tariff on iron and steel products. This is the reason that at least two large American steel companies are watching Canadian developments closely and are expected to establish Canadian production facilities in case the Bennett government accords a full measure of protection to the steel industry.

Free Wheeling Gains

FREE wheeling refuses to step out of the spotlight. Sears, Roebuck & Co. is offering a free wheeling device for model A Fords for \$15.45, plus installation charges. Sales possibilities are being tested in Michigan, and national distribution will be attained by June 1, when the device is listed in the new issue of the company's catalog. Another maker is said to be about ready to adopt the free wheeling principle.

First shipments of the new Marmon 16 with an all-aluminum engine

have started from the factory at Indianapolis. The engine is being manufactured in a new unit of the Marmon plant. The body is constructed in another unit under a new system whereby rigid inspection is made during every stage of production. The DeVaux six is now in production at Grand Rapids, Mich. The DeVaux-Hall Motors Corp. also has its Oakland, Cal., factory tooled up for production. DeVaux-Hall officials, including Norman DeVaux, president, and Col. Elbert Hall, vice-president, migrated to Michigan from California to build their new six.

Three General Motors companies have recently begun the electrolytic tin plating of pistons. This new process is said to aid in smoother performance and is being watched with interest by other manufacturers. Concurrent with this development is the appearance of newly designed oil control piston rings, which offer a combination of milled slots and interrupted grooves arranged to provide uniform wall pressure. The ring is made from high-test electric furnace iron and is individually cast from cam-turned patterns.

Blanking of metal parts, especially brake drums, by steel mills before the material is shipped to automotive plants has not gone forward so rapidly in recent weeks. In some cases it is reported that savings have not been as great as anticipated. However, steel companies which have not yet installed press equipment for blanking purposes are continuing to watch the situation closely and are not hopeful that this practice has subsided. They still are of the opinion that they probably will have to meet the challenge eventually by pro-

viding the same service as their competitors.

Wire wheels for automobiles are "the rage" just now. No manufacturer will venture an answer as to how long their popularity will last. One company declares that there is a recurring cycle in which disk wheels, then wood wheels, and finally wire wheels gain favor. It sees no reason why this cycle will not continue, possibly with some slight variation.

Gain in Truck Sales

TRUCK sales have turned upward, although first quarter production was far below that in the same period of 1930, and the second quarter has not brought any spectacular gains. The biggest competition in trucks, of course, is centered in the light delivery lines. Since it acquired the Martin-Parry truck body plant at Indianapolis last October, Chevrolet has turned out 22,000 bodies there. In that time it has renovated the buildings, replaced obsolete equipment and schooled workmen in precision methods of manufacture called for in body designs. The development at Indianapolis consists of 40 acres of ground and 700,000 sq. ft. of plant and storage space.

The second blast furnace of the Hanna Furnace Corp. at Zug Island will probably be blown in early in May. In addition to taking hot metal from the present active furnace, the Great Lakes open-hearths are consuming rapidly the cold pig iron which had accumulated in recent months. Pig iron shipments to automobile foundries in April are likely to show a 10 to 15 per cent gain over March. It will be remembered that March shipments were 15 per cent greater than in February.

FORD MOTOR CO. MAKES TWENTY-MILLIONTH CAR

THE FORD MOTOR CO. ran its twenty-millionth car off the assembly line on April 14. Henry Ford and Edsel Ford posed for a picture with the car to celebrate the event. No. 20,000,000 will make a tour of the country and then will be placed in Ford's Greenfield Village alongside the first Ford, built in 1893.



New Nomenclature for Sheets Announced, to Take Effect May 1

American Rolling Mill Co. Sets Up New Designations to Rectify Confusion Resulting from Continuous Process

THE American Rolling Mill Co. on Tuesday announced new nomenclature for sheet steel products and a new set-up of price differentials, to take effect May 1. The official announcement is as follows:

"The necessity for simplifying the present system of gage differentials and standardization of quality with a nomenclature representative of the character of the product, together with a differential above or below a base price more in harmony with actual cost, became of paramount importance with the introduction of the continuous mill method of rolled sheets. As this new method of rolling and processing sheets was adopted by a number of corporations, and as they and other companies revamped their mills, furnaces, and methods of processing strip and sheets, the confusion both to buyer and seller proved conclusively that old methods of arriving at gage differentials and standards of quality were obsolete and totally inadequate under the new conditions.

"Under the old conditions, the buyer could obtain the quality suited to his requirements by specifying the process by which the material was to be produced. That is, if full-pickled cold-rolled sheets were required, the sheets were so ordered and he received the product resulting from such processing. As standards of quality became more rigid, and due to the several ways and new methods of manufacturing sheets, that procedure of ordering sheets became unsatisfactory and precarious. The result has been that sheets are now ordered to standards of quality to meet certain requirements. Both the producer and buyer do not therefore think in terms of processing, but instead in terms of material which will satisfactorily fulfill the buyers' needs. As a matter of fact, buyers are no longer particularly interested in the methods by which sheets are produced. But they are vitally interested in the finished product, its cost, and utility in fabrication and service.

"Logically, then, the price and quality of sheet products should be based on the cost and grades ordered. This eliminates the necessity of specifying the processing or treatment of the sheets to meet the buyers' requirements. It is the established practice to purchase hot-rolled strip and cold-rolled strip steel in this manner.

"In the face of these conditions, and as creators of the continuous method

of rolling, we have felt keenly the responsibility for developing a new selling structure, in harmony with costs and improved production methods, which will adequately represent the needs of the sheet-consuming public and be fair alike to consumer and producer. It is our earnest hope and belief that the new methods will be recognized as of merit and value to the trade at large. After long, earnest study, and analysis of all methods of production, we have established such a structure and propose to sell our products on this new basis beginning May 1, 1931."

Three General Classifications Adopted

The nomenclature by which sheets have been described will be changed in the following manner: The designation "hot-rolled annealed" takes the place of sheets heretofore known as "one-pass cold-rolled," "box annealed," "black sheets" and "blue annealed." "Cold-rolled sheets" replace "single-pickled cold-rolled" and "full-pickled cold-rolled," and will be a commercial grade not subject to special inspection, being supplied in what is generally described as "mill run."

The price of hot and cold-rolled sheets will be on separate basis similar to hot and cold-rolled strip steel. Automobile body sheets and furniture sheets will be supplied inspected to buyers as standard and seconds as-

sorted. No change is to be made in the pricing method of galvanized, long terne or electrical sheets or in the size extras for the various grades of sheets.

Hot-rolled sheets off the continuous mill, 24 to 48 in. in width, will be established on a No. 10 gage base, with a differential of 5c. per 100 lb. When annealed sheets (box annealed and blue annealed) are required or when sheets wider than 48 in. are needed, it will be necessary to make them on other than continuous mills. They therefore will require process annealing, the extra for which will be 15c. per 100 lb. When less than 5 tons per item is ordered, such tonnage must be made on sheet or jobbing mills; and, as it must be further annealed, the 15c. per 100 lb. extra will be added. A charge of 25c. per 100 lb. for extra smoothness is applicable to box annealed unpickled sheets only.

Hot-rolled sheets are the product from a continuous mill without any tempering treatment and can be used for ordinary forming. Hot-rolled annealed sheets, 24 in. and wider, will be priced on a No. 24 gage base with a differential of 5c. for heavier gages and of 5c., 10c. and 15c. for the lighter gages. A charge of 15c. is to be made for deoxidizing and one of 25c. for extra smoothness, the latter being applicable to unpickled sheets only.

Cold-rolled sheets and furniture sheets, No. 16 gage and heavier, 24 in. and wider, will carry a price based on No. 10 gage with the same differential as on hot-rolled sheets. No. 20 gage will be used as the base for cold-rolled sheets No. 17 gage and lighter. Automobile body sheets, 24 in. and wider, will continue to be priced with No. 20 gage as the base.

The new base prices under the proposed plan will be announced by the American Rolling Mill Co., probably in the next week.



Courtesy of Judge

"Ah, business is better?" "No, it isn't that. I just turned it sideways."

PERSONALS

BERTRAM D. QUARRIE, for the last three years president of the Oliver Iron & Steel Corp., Pittsburgh, has resigned. He has been identified with the iron and steel and allied industries almost continuously since his graduation from the Case School of Applied Science, Cleveland, in 1903, having begun as a chemist at the Mesabi Range iron mines. Following service as chief chemist for the Cleveland Furnace Co., Cleveland, he was advanced to the superintendency of the blast furnace. He later served as assistant superintendent of the Central furnaces, American Steel & Wire Co., Cleveland, and after a short period as blast furnace superintendent for the Inland Steel Co., Chicago, he returned to Cleveland as superintendent of the Central furnaces. He next became general superintendent of the Newburg steel works of the Steel & Wire company, leaving that position to become general manager of the Otis Steel Co., Cleveland. Two years later he became vice-president of the Paper & Textile Machinery Co., Sandusky, where he remained until April, 1928, when he went with the Oliver corporation.

R. E. J. SUMMERS has resigned as vice-president and contract manager of the H. K. Ferguson Co., Cleveland, and with a group of associates has organized Summers Engineers & Constructors, Inc., which will specialize in industrial engineering and construction. Offices have been opened in the Terminal Tower Building, Cleveland, and the Graybar Building in New York.

P. E. BLISS, president, Warner & Swasey Co.; GEORGE S. CASE, president, Lamson & Sessions Co.; W. C. CONNELLY, president, D. Connelly Boiler Co., and ARTHUR G. MCKEE, president, Arthur G. McKee & Co., Cleveland, have been elected directors of the Cleveland Chamber of Commerce. LOUIS W. GREVE, treasurer, Cleveland Pneumatic Tool Co., has been elected a vice-president.

S. S. FRENCH, vice-president, Lyons Metal Products Co., Aurora, Ill., has become assistant general manager, and A. W. LAUDER, sales manager, has been made vice-president in charge of sales. J. S. SPROUT, who is manager of the steel furniture division, has been appointed general sales manager, and E. D. POWER, formerly manager of the automotive division, has become director of research.

AUGUSTUS M. SAUNDERS, for more than 47 years identified with the Na-

tional Tube Co., Pittsburgh, will retire on May 1 to take up his residence in Los Angeles. For many years he was superintendent of the company's mills at McKeesport, Pa., and more recently has served as secretary of the patent committee and consultant.

VINCENT E. McMULLEN, works manager of the Indianapolis plant of Fairbanks, Morse & Co., has been elected president of the Indianapolis branch of the National Metal Trades Association. Other officers elected are FERDINAND BARNICKEL, president of the Indianapolis Drop Forging Co., vice-president, and J. M. CASWELL, secretary of the Diamond Chain & Mfg. Co., treasurer.

FRANK B. COYLE, research metallurgist, International Nickel Co., is scheduled to deliver an address on "Principles of Alloy and High-Test Cast Irons" before the Springfield, Mass., chapter of the American Society for Steel Treating, on April 23.

SAMUEL S. BUCKLEY, former president of the Onondaga Steel Co., and more recently in charge of ingot mold sales for the Straight Line Engine Co., Inc., Syracuse, N. Y., has become identified with the sales department of the Vulcan Mold & Iron Co., Latrobe, Pa.

FRANK R. BACON, who was president of Cutler-Hammer, Inc., Milwaukee, from 1898 to 1924, when he was made chairman of the board, has been elected president to fill the vacancy caused by the death of Beverly L. Worden.

J. R. PORTER has been renamed president and general manager of the Marshall & Hushart Machinery Co., Chicago. Other officers elected at the recent meeting of the board of directors are: FRANK SEESE, secretary and treasurer; GEORGE R. RAY, vice-president; GEORGE HABICHT, JR., assistant to president and general manager, and C. P. STOLLSTORFF, assistant secretary and treasurer.

ALEXANDER F. BANKS, who has been president of the Elgin, Joliet & Eastern Railroad for the past 30 years, will retire May 1. He started in railroad business as a messenger boy in the service of the St. Louis & South-eastern Railroad at Evansville, Ind. He has been with the Elgin, Joliet & Eastern for 37 years. S. M. ROGERS has been elected to succeed him.

CARLETON BECKWITH, heretofore assistant to the late Charles F. Olin, has been appointed advertising manager of the New Departure Mfg. Co., Bristol, Conn. Following his graduation from Amherst College in 1911, he joined the sales department of the New Departure company and two years later was made first assistant to Mr. Olin.

WILLIAM T. KILBORN, formerly vice-president and general manager of sales of the Graham Bolt & Nut Co., Pittsburgh, has been elected vice-president in charge of sales of the Hammond Bolt & Nut Corp., Hammond, Ind., with offices in Chicago.

DON M. EDDY has been elected president of Hanna Furnace Corp., of Delaware and Hanna Furnace Corp. of New York, two of the principal subsidiaries of National Steel Corp., succeeding the late Charles A. Collins. Mr. Eddy was previously director of purchases for M. A. Hanna Co. at Cleveland and later in charge of sales of Hanna Furnace Corp. at Buffalo. He will make his headquarters at Buffalo. E. KAY FORD has been elected vice-president in charge of sales of Hanna Furnace Corp. of Delaware. He will make his headquarters in Detroit.

MYRON C. TAYLOR, chairman of the finance committee of the United States Steel Corporation, sailed from New York April 22 for a two months sojourn in Europe.

EDWARD MOSEHAUER, vice-president, Metal Sales Corp., New York, will sail for Europe on the Bremen, April 24, on a business trip.

EDWARD K. BAUER has been appointed manager of sales of the Philadelphia district and HARRY F. KNAPP has been made manager of sales of the Washington district of the Carnegie Steel Co., succeeding the late James B. Bonner, who was manager of sales of the Philadelphia district, which included the Washington district, now made a separate district. Both Mr. Bauer and Mr. Knapp were assistants to Mr. Bonner, the former in the Philadelphia and the latter in the Washington offices. Before his association with the Philadelphia office, Mr. Bauer worked at the Pencoyd plant of the American Bridge Co. Mr. Knapp has been in the Washington office since 1917 and prior to that time was engaged with the sales department of the Carnegie company in the Philadelphia office.

OBITUARY

JOSEPH BODINE TERBELL, chairman of the board of the American Brake Shoe & Foundry Co., New York, died at his home in New York on April 15 after a long illness. Born in Corning, N. Y., on Feb. 12, 1863, Mr. Terbell was graduated from Hamilton College in 1884, going to work with the Fall Brook Railway Co. He remained in this work until 1897, when he became president of the Corning Brake Shoe Co. It was while occupying this position that he assisted in bringing about a merger in 1902 with the American Brake Shoe company, of which he became vice-president. He was elected president in 1919 and retired in 1929 to become chairman of the board.

JOSEPH FRANCIS SAVAGE, formerly general manager of the American Tube & Stamping Co., Bridgeport, Conn., died after an illness of two weeks at his home in Brooklyn, April 18, aged 46 years. He was graduated from the Sheffield Scientific School of Yale University in 1907 and that autumn began to learn steel manufacture, later becoming general manager of the American Tube & Stamping Co. He then went to Cincinnati as vice-president and general manager of the Hamilton Furnace Co., remaining until 1928, when he became a stock broker.

JOSEPH R. ELLICOTT, for many years an official of the Westinghouse Air Brake Co., died of heart disease at his home at Ormond Beach, Fla., on April 16. He was born in Batavia, N. Y., in 1858 and received his schooling in the public schools of Grand Rapids, Mich. After a short period with the First National Bank of that city, he entered railroading, becoming a fireman on the Michigan Central and continued in railroad work for some time. He then became, successively, general manager of the Ajax Forge Co., Chicago; Eastern sales manager of the Griffin Wheel & Foundry Co., New York, and organizer and director of the General Agency Co., a railway supply company, New York. In 1898 he was made general manager of the Standard Air Brake Co. and, when that company was taken over by the Standard Traction Brake Co., which was in turn controlled by the Westinghouse Air Brake Co., Mr. Ellicott was made manager, with headquarters in New York. In 1905 he was appointed New York district manager of both the Westinghouse Traction Brake Co. and the Westinghouse Air Brake Co., remaining in this position until 1919, when he asked to be relieved of active duty.

F. A. ESTEP, formerly chairman of the board of the R. D. Nuttall Co.,

Pittsburgh, now a division of the Westinghouse Electric & Mfg. Co., died in St. Petersburg, Fla., on April 12, aged 82 years. He was born in Allegheny, Pa., and attended the Western University of Pennsylvania. After a short period with the Allegheny Heating Co., he went with the Nuttall organization and was made its president and treasurer in 1893. He became chairman of the board in 1925, holding that position until his retirement in 1928.

GEORGE E. VAN HAGEN, JR., assistant to the president of the Standard Forgings Co., with plants at Chicago and East St. Louis, died April 11 at Miami, Fla., after an appendicitis operation. He was born in Chicago and received a degree from the University of Wisconsin. He joined the Standard Forgings Co., of which his father, George E. Van Hagen, Sr., is president, about 10 years ago. He was in the sales department for about five years and was then promoted to the position he held at the time of his death.

STANTON PALMER, president, Snap-On Wrench Corp., Kenosha, Wis., died on April 13, after a brief illness at his residence in Chicago. He was born at Newport, R. I., in 1873 and

before becoming head of the Snap-On company, was active in the wrench and tool industry at St. Louis, Denver, Fort Worth and Chicago.

PORTER POLLOCK, president since 1913 of William B. Pollock Co., Youngstown, blast furnace builder and fabricator of heavy steel materials, died of pneumonia on April 21, aged 67 years. He is credited with perfecting development of hot metal and cinder handling equipment for blast furnaces and steel plants.

HENRY A. GRAY, secretary and treasurer of the Illinois Steel Co. from 1886 to 1897, died at his home in Lake Bluff, Ill., on April 20, aged 79 years.

CLIFFORD E. PIERCE, president, Betz-Pierce Co., steel jobber, Cleveland, died after a brief illness April 20, aged 50 years. He spent his life in the steel industry in Cleveland, starting as an office boy in the former jobbing house of Bassett, Presley & Train Co., and was for a long time connected with its successor the Bassett, Presley Co. In 1911 he organized the Betz-Pierce Co. He was a director of the Van Dorn Iron Works Co. and of the Fulton Foundry & Machine Co., Cleveland, and president of the Massillon Steel Castings Co., Massillon, Ohio. He was prominently identified with the Rotary Club of Cleveland and served as its president for several years.

Plant Visits Feature Cleveland Convention

Five trips of inspection to Cleveland manufacturing plants featured the "contact" side of the meeting last week of the American Society of Mechanical Engineers and other organizations. These trips proved, through the variety and interest of what was shown the visitors, one of the high spots of the convention. Special buses took the members to and from the plants visited. The itinerary follows:

Westinghouse Electric & Mfg. Co.—The Westinghouse plant has been augmented recently by the addition of several manufacturing divisions moved from other plants. New methods and new equipment are being installed to handle the added production.

Willard Storage Battery Co. and Fisher Body Co.—The plant of Willard Storage Battery Co. is said to be the largest of its kind. Here was seen every step in the manufacture of the Willard storage battery. Assembly and testing, on belt conveyors, were served by the arrival of parts overhead, within easy reach.

Fisher Body plant is devoted entirely to the manufacture of Chevrolet bodies, and is in full operation in

every department. About 4000 bodies a day are being made. Here were seen the largest crank presses ever made and an interesting variety of materials-handling equipment.

Hupp Motor Car Co.—A tour of all departments of the Cleveland plant of Hupp Motor Car Co., which has been newly equipped for the production of free-wheeling automobiles.

Lamson & Sessions Co. and Midland Steel Products Co.—At Midland Steel Products Co. heavy forming operations on automobile frames were observed. Frames for Ford passenger cars and trucks and the new heavily braced Auburn frame were being made. A large modern tool and die shop was shown. This trip afforded an opportunity to study electric welding on a large scale. A feature of the trip was the testing laboratory.

At Lamson & Sessions Co. were found the latest methods in the manufacture of bolts of all sizes and shapes. The plating room was of particular interest, through the absence of fumes.

American Steel & Wire Co., Cuyahoga works.—The American Steel & Wire Co. modern continuous hot rod and strip mills, in the manufacture of wire and roll strip. This trip proved to be a feature from the standpoint of spectacular operations.

Was Steel Production at Peak in March?

BY DR. LEWIS H. HANEY

DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

OUR measurements this month show steel ingot production in March at 64.8 per cent of normal. This compares with 61.2 per cent in February, 52.1 per cent in December, and 94.7 per cent a year ago. Pig iron production stands at 62.7 per cent of normal, against 61.3 per cent in February, 57.3 per cent in December, and 100.7 a year ago.

Thus, pig iron production has fallen further below a year ago than has steel production. It has recovered less from the December low and it is further below its estimated normal level. Accordingly, one of the former maladjustments in the industry has been corrected, and pig iron is in a relatively strong position.

It remains to be seen whether the ingot output will now have to be reduced much. Steel works have been operating at reduced percentages of capacity in recent weeks, owing partly to seasonal factors and partly to the depressed condition of the chief consuming industries. It is, therefore, possible, if not probable, that the position of pig iron will not be so strong at the end of the second quarter as at the beginning.

It is normal for steel production to decline from March through July, when a distinct but smaller seasonal upward trend begins, which normally carries it to a secondary peak in October. Possibly the demand for steel, though remaining low, may fall less than usual between now and July, but such a development might not become fully effective in production schedules, since our measurements indicate that there has been some over-production of crude steel and, therefore, an accumulation of inventories.

Unfilled orders of the Steel Corporation in March gained somewhat more than usual for the season. They remain low, however, and the increase appears to have been partly the result of driving in busi-

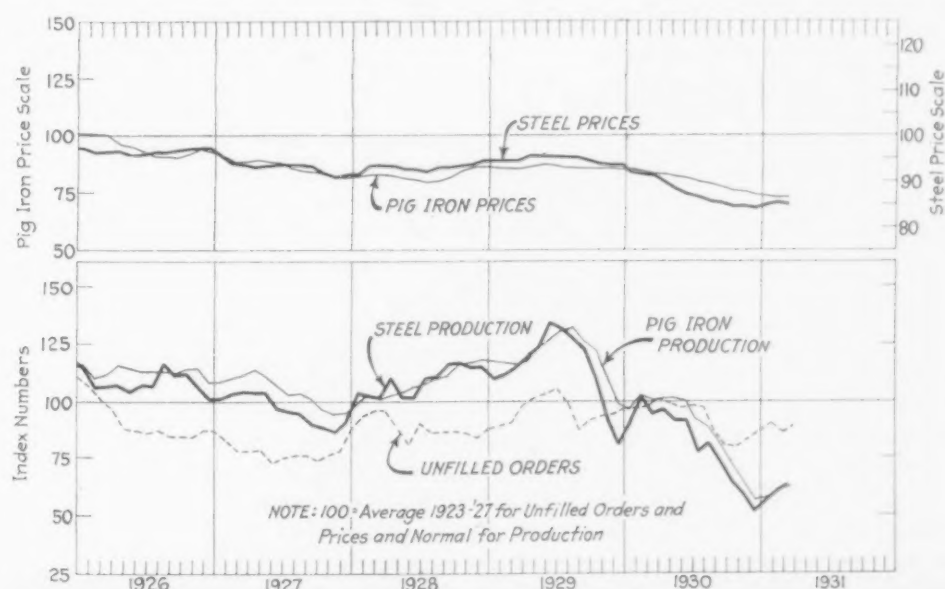
ness, with future specifications somewhat uncertain. Possibly, too, the gain may have been partly due to decreased shipments.

In any case, there has been no strength shown in our monthly average prices. Taking the average for 1923-1927 as a base, we find the finished steel index for March at 84.6, or practically unchanged from last October and November. This compares with 84.9 in February, and 91.2 a year ago. The pig iron price index reached a new low monthly average at 73.4, against 73.6 in February and 83 a year ago.

Our various barometers suggest that (1) some downward readjustment in the average price of finished steel remains to be made; that (2) pig iron prices will hold well for a time, but round off a little in May or June; and that (3) the steel scrap markets will show weakness at least until June.

On the other hand, steel production is rounding off. Two of the most sensitive items, scrap and sheets, have declined in price. And the larger regular consumers of the steel industry are much depressed. Thus we find that, while sheets are low enough in price, pig iron output is in line with steel works' requirements, and occasional large orders for structural steel develop. Nevertheless, buyers still lack confidence and the ground is not thoroughly prepared for a sustained expansion.

With the automobile industry taking less steel, and building activity (adjusted) touching a new low, we find but a minimum regular demand for sheets, nails, and pipe. Railroad freight tonnage also touched a new low in March. The unfavorable farm situation seriously limits the demand for agricultural implements, fencing, sheets and the like. It thus seems that buying for public works can hardly be sufficiently broad and sustained to offset the backwardness of the regular customers.



Steel and pig iron production appear to have got into better relationship. Prices may be weak, except perhaps for pig iron, for a month or more. Pig iron is in a relatively strong position.

Seasonal Variations in Steel

MUCH has been said in the last few weeks about "seasonal variation" in the rate of steel production, with discussions whether steel will follow its "usual downward" course. The impression may be created that steel has been very regular in that matter, but such is scarcely the case. There is a very decided preponderance of precedents, but when it comes to measuring the decrease wide variations are found, and that raises doubt whether the decline is so normal or natural, so nearly inevitable indeed, as is sometimes assumed.

All references nowadays are so uniformly to prospective decreases from the March rate, or possible returns to the March rate, that a survey of the course of affairs in recent years is conveniently made by expressing daily rates of ingot production in each month of the respective years in index numbers, with the March rate of the year as 100. The relatives are as follows:

Relative Rates, Steel Ingot Production
(March = 100)

	1923	1924	1925	1926	1927	1928	1929	1930
January	94	84	96	96	87	92	85	85
February	96	95	97	95	95	97	93	103
March	100	100	100	100	100	100	100	100
April	105	80	85	95	94	103	98	97
May	104	60	82	91	93	93	100	90
June	96	51	76	87	80	86	101	83
July	94	45	74	84	76	91	95	68
August	91	61	82	93	77	93	94	72
September	89	67	83	91	77	99	93	67
October	88	72	89	95	76	103	86	61
November	80	77	97	86	72	98	69	54
December	76	85	95	81	73	96	60	47
Year	93	73	88	91	83	96	90	77

The matter is one of searching for an ordinary, typical or natural year, so a course of elimination is followed. Years prior to 1923 obviously do not count as there were great post-war swings. In 1923 April, not March, was the high month and then there were declines throughout the year; no autumn recovery. In 1924, 1925 and 1926 there were seasonal swings of what is considered usual character, but the swings were of widely different extent. The next year conformed in its first seven months, then failing to show autumn recovery. In 1928 April instead of March was the high month, and then October equaled it. In 1929 May was a shade above March although taking an index number of 100, and June was approximately one point higher. In 1930 there was a February peak, with substantially continuous decreases thereafter.

Of the eight years only three, 1924, 1925 and 1926, had swings of really identical character, while the decreases March to July were respectively 55, 26 and 16 per cent. That is certainly no clear lead for this year to follow. Moreover, those were active years,

two of the three making new high records as to calendar year totals. Two subsequent years, 1928 and 1929, had peaks later than March, and 1928 made the unusual showing of averaging only 4 per cent under the March rate.

One may conclude that there is a disposition to overwork the precedent of seasonal decrease during the second quarter of a year, while a year which is off generally in tonnage may easily show swings different from those of active years.

Earnings and Spendings

THE National Industrial Conference Board estimates the national income in 1929 at 84 billion dollars. This is in close agreement with the estimate of Dr. W. R. Ingalls, previously given in the *Annalist*, which was 83.4 billions.

In the discussion of our public affairs more attention should be given to this figure. It represents our collective earnings, out of which our expenditures are made, just as in the instance of an individual. There is a difference, however, in that one individual may borrow from another, and so become able temporarily to live beyond his income; but a nation, which comprises all of the individuals, cannot do that unless it borrows from other nations. Nor can a nation draw upon its reserves, i.e., its wealth, except insofar as they consist of gold and stocks of consumable goods, which in the aggregate constitute a relatively small part of any national wealth.

The national income is our collective earnings, out of which we have to live and out of which we have to save in provision for the future. We have no recent data in respect to our national saving, but it appears, more or less conjecturally, that during the last decade we have saved not more than 10 per cent of our income. Russia in the execution of its five-year plan appears to be trying to save about 50 per cent of its small income, living miserably upon the remainder.

If our national income contracts, as it did in 1930, for which tentative estimates are 70 to 75 billions, and probably more nearly to the lower figure than the higher, our living or saving, or both, must also contract.

The division of income between capital and labor, or among classes of people, does not affect the balance sheet. Whatever accrues to some people to such an extent as to provide them with a surplus must be spent by them in the employment of labor, for there is nothing else that they can do with it unless they should acquire and hoard gold; and there is not gold enough in the world to permit that to be done as a general procedure.

The world's possession of gold is only a little more than 10 billions. That of America is less than five

billions, a small figure in comparison with our national income, which reveals that we do not earn gold, or money, but earn goods and the enjoyment of services, which gold, or money, enables us to exchange among ourselves with avoidance of the clumsy method of bartering.

Subtraction from the national income, through taxation, for excessive expense of Government, or for wasteful construction of public works, or for pensions, bonuses or doles are dissipations of earnings. While such things are dissipators, there are also diminishers, the chief of which are the diversion of labor to useless work and the abstention of labor from doing any work, which abstention may be either voluntary or involuntary. If earnings are entirely consumed for living expenses, the building of houses may cease. We might for a while maintain our consumption of food and tobacco, but with the curtailment of building the artisans of that industry would fail to have work, unemployment would spread among producers of all kinds of materials, and in the end repercussions would be felt in the textile industries and others. So begins the diminishing of income.

The politicians who have so carelessly appropriated the national income in wasteful ways, many of which have a strong emotional appeal, must reflect in respect to what they are doing. There is no reservoir of money that simply waits to be tapped. What they are doing is to subtract from the earnings of the people. Anything that discourages work and thrift is a subtractor.

It is out of the surplus of the thrifty that construction is done. If that surplus be diminished by economic adversity or excessive taxation, there is less employment for the builders, who constitute about 10 per cent of our non-agricultural workers, and for the workers who supply them with materials.

When the Government undertakes building with the thought of relieving unemployment it functions extravagantly and so promotes squandering. While appearing to increase employment, it impairs it on the whole. Governmental paternalism is a destroyer. This leads to socialism, which is a quicker destroyer. This leads to communism, which is the quickest of all.

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Foolhardy Machinery Selling

AS is well known, the machinery industry suffers severely during depression. A recent statement by the National City Bank gives the combined experience for 103 machinery manufacturers whose net earnings declined 59.4 per cent when the experience of 1930 is compared with that of 1929, creating a condition where the manufacturers are obviously hungry for business, and wherein management is tempted to make every possible effort to secure an order.

The machinery industry in Europe is in an even more desperate position. A communication from a source believed dependable contains the following:

A traveling representative of the firm ———, London, has been in Venezuela and has offered to sell centrifugal pumps on four installments of equal parts, coming due in six, twelve, eighteen and twenty-four months. This offer he said was for any order of more than \$10.

Most of us are greatly interested in keeping this machinery business on a basis that is clean, business-like, profitable and attractive, yet obviously any such sales policy on the part of an important firm, such as is the pump builder mentioned, can only lead not only to the further and perhaps complete demoralization of the centrifugal pump industry, but also the demoralization of the trades it serves. Here we have the instance of excess factory capacity that leads to unintelligent competition and profitless operation.

Also, we have here the source from which flow the insistent demands from many countries that American manufacturers export on credit. Such are the likely explanations for the present embarrassment of some important machinery manufacturers. Certainly no American manufacturer will care to compete with the British company by such extreme liberality.

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Steel Capacity Gain Was Forecast

READERS of THE IRON AGE were not unprepared for the large gain made last year in steel ingot capacity shown by the annual finding of the American Iron and Steel Institute, given in last week's issue, page 1214-D, for it was forecast in this department of the issue of Jan. 16, 1930, when capacity as of Dec. 31, 1929, was estimated at 63,500,000 tons and capacity at the end of 1930 was forecast at "about 67,000,000 tons." In the issue of May 15, 1930, when the ascertainment for Dec. 31, 1929, had just been made, it was pointed out that the 63,067,549 tons then shown was just two-thirds of one per cent under our estimate. The forecast of 67,000,000 tons for the end of 1930 was then repeated. The institute finding just published shows 66,897,096 tons for Dec. 31, 1930, whereby our forecast was out by only one-sixth of one per cent. Of course the extreme closeness is purely chance, for future capacity could not possibly be ascertained with such precision, and there was new construction coming to completion at around the official date, with no certainty a year previous whether it would really come in before or after the date.

The increase in steel ingot capacity during 1930 was 6.07 per cent, made almost entirely by basic open-hearth, with a small tonnage increase in electric, and these grades had to offset nearly half a million tons decrease in Bessemer. The largeness of the increase is of interest as a point in connection with the future of the steel market, and the wherefore is of interest.

One must not fancy that the increase of 4,360,900 tons in basic open-hearth was made by steel companies turning in to build new units equal to that capacity. As was pointed out in the discussion Jan. 16, 1930, in the three years 1926-7-8 there appeared to be about 1,200,000 tons a year increase in capacity not due to the building of new units, but represented in improvements of various sorts to existing units, and the facility that comes with practice. We may take it that there was not a great deal of that during 1929, when there was little inclination to close departments for changes, but a great deal of it in 1930.

The annual report of the Steel Corporation noted an increase of 912,000 tons in its capacity during 1930, so that the Corporation appears to have supplied less

than one-fourth of the industry's increase. For 1931 the report stated the increase would be about 1,925,000 tons, to 28,000,000 tons at the close of the year. With new construction in progress by independents, and with improvements to existing plants, it is plainly indicated that capacity at the close of this year will be in excess of 70,000,000 tons.

The combined increase last year and this, say 11

or 12 per cent for the two years combined, represents a temporary return to a rate of growth of long ago. Referring to capacity at the end of a year, from 1878 to 1899, 21 years, capacity was multiplied by eight, approximately, representing a rate of doubling in seven years; from 1899 to 1909 there was approximately 130 per cent increase; 1909 to 1919, 71 per cent; 1919 to 1929, 27 per cent.

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Railroads Must Look to Metallurgy for Economies

BIRMINGHAM, April 21.—Railroads are hard pressed by competition, but instead of waiting for legislative assistance or other outside help, they should dig for new economies, said C. E. Barba, mechanical engineer, Boston & Maine Railroad, Boston, in addressing the railroad session of the 1931 semi-annual meeting of the American Society of Mechanical Engineers at the Tutwiler Hotel. No greater economies are offered than in the field of metallurgy, he declared.

To Increase Life of Locomotives

"Through adoption of new alloy steels in the construction of locomotives," he continued, "it should be possible to increase their life from 85,000 or 90,000 miles between shoppings to 125,000 or even 225,000 miles. The railroads should abandon past practice and make use of all present information available in metallurgy, so that there may be the best possible utilization of materials in designing equipment to meet competition. A closer association between railroad engineers and steel plant metallurgists is in order."

Alloy steels must be handled properly in the shop, Mr. Barba stated. "Shop hands must be educated to better methods of doing things than with ordinary carbon steels and above all closer inspection is necessary. Progressive fractures in side rods have been traced to mere nicks. Machine work plays a very important part in the use of alloy steels. Railroads must be equipped to handle them.

Challenges Machine Tool Builders

"It is like buying cutting tools. They won't perform as predicted because machine tools have not yet been built for them. The machine tool industry has much to learn to keep up with what metallurgists are developing in cutting tools. Possibly 75 per cent of the machine tools now in service should be scrapped because of obsolescence."

The idea of bringing together the railroad man and the steel mill metallurgist is a good one, declared A. E. White, professor of metallurgical engineering, University of Michigan, but it does not go far enough. He believes that in the end it will be necessary for every railroad to hire the highest type of metallurgist that it can employ.

The automobile industry, in his opinion, would not have progressed as it has if it had depended on the steel mill metallurgist. Formerly all alloy steels were sold under brands and it remained for the automotive metallurgists to break down these brands and force

their sale on the basis of analysis. Now they are similarly breaking down tool steel brands.

Will Heat Treat Rails in Lead Bath

Safety is the most important consideration in railroad service, he continued, and "alloy steels are not foolproof. In fact all alloy steels are more tender and more subject to damage when improperly handled than plain carbon steel. Liberal ingot discards are important and careful inspection really requires a deep etch test. The matter of design cannot be overstressed. When the design of a piece is poor, no alloy steel and no heat treating will correct it."

Heat treated rails may soon be a commercial reality, said William Elmer, special engineer, Pennsylvania Railroad. A large steel company has developed what seems to be the commercial basis of a method for heat treating by immersing rails in a lead bath. A premium of \$20 a ton over the \$43 price has been asked for this treatment and the Pennsylvania Railroad expects to have 20,000 tons so treated in order to give the method a thorough trial.

The lead bath method is slow and consequently only one out of five rails rolled will be heat treated. The Brinell hardness of the heat treated rail will be twice that of untreated rails and this will introduce new requirements in equipment.

Present drills and benders will be useless and new cutting saws will have to be devised. The 130-lb. rail as redesigned by the Pennsylvania Railroad weighs 131 lb. Rails of 131-lb. section are now being laid. The heaviest rail yet designed by the railroad weighs 152 lb. and is expected to be rolled some time this year.

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Effect of Smelter Atmospheres on Enamels for Sheet Steel

IF, as has been proved, the presence of certain gases is harmful to an enamel during the burning process, it is not unreasonable to assume that their presence may be deleterious to the enamel during smelting, also. With this thought in mind work in the Engineering Experiment Station of the University of Illinois was designed to make a preliminary study of some of the gases evolved in the smelting of enamels for sheet steel, and to determine the effect of certain smelter atmospheres on the quality of the enamels.

Details of apparatus and procedure are explained in Bulletin No. 224 of that station.

MARKETS



Steel Production Trend Continues Downward At Moderate Rate

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INGOT Output Now at 49%
—Pipe Line and Structural
Projects Promising—Scrap
Prices Again Decline
▼ ▼ ▼

STEEL production has again eased off to about 49 per cent of capacity for the country as a whole from 51 per cent a week ago and 57 per cent at the March peak. This is the fourth week of the decline, following a slow though uninterrupted rise from the first of the year to the latter part of March. Current operations are back approximately to the average of the last half of 1930, erasing the improvement that occurred during the first quarter.

The recession this month strengthens the impression that the spring rise was largely seasonal in character, the April downturn conforming with the trend commonly experienced at this time of year.

DEVELOPMENTS within the industry and outside of it have served as a restraining influence upon buyers, intensifying the caution which has marked their commitments for some time. The uncertainty of the price situation, particularly in flat rolled products, and the sharp decline in securities prices may be cited as factors that have had a decided effect on business sentiment.

The discussion of wage reductions in the steel industry, though they have been mentioned in no official way, has possibly had a further unsettling effect, as steel consumers are well aware that cost savings in the steel industry are generally passed along to them in whole or in part in the form of lower prices.

Further declines in scrap quotations in several centers are a reflection of the hesitant buying that prevails among iron and steel producers themselves. THE IRON AGE composite price for heavy melting steel has declined to \$10.75 a gross ton from \$10.83 last week, a new low since the first half of 1915.

NOTWITHSTANDING the discouraging factors, a sufficient volume of business is in sight to support the view that operations may be sustained at somewhere near the present level during the next several weeks.

An encouraging improvement in retail sales of motor cars this month, together with a semi-official estimate that April output of automobiles will total not less than 330,000 units, compared with nearly 287,000 last month, strengthens the expectation that May's record will at least equal that of April, although manufacturers are not venturing predictions.

BUILDING construction activities are marked by a fair number of large projects, but small work, which normally makes up a considerable proportion of the aggregate tonnage, is coming out sparingly. An outstanding project, on which bids will be asked soon, is a bridge over San Francisco Bay, calling for 110,000 tons of structural shapes and cables.

About 30,000 tons of plates will be required for a fabricated pipe line in California.

The outlook for oil and gas pipe line projects is clouded by the effort on the part of the railroads in Texas to have pipe line companies in that State classified as common carriers. However, a Pittsburgh maker has booked 35,000 tons of 12-in. seamless pipe for a 160-mile line in east Texas for the Sinclair interests.

A SWEEPING change in nomenclature of various finishes of sheet steel that may affect the entire price structure of these products has been announced by the American Rolling Mill Co. The aim is to rectify the confusion which has resulted from the introduction of the continuous process of rolling sheets. Such familiar designations as black sheets and blue annealed sheets will, under the new plan, be discarded, and sheets will be divided into three general classifications, namely, hot-rolled, hot-rolled annealed and cold-rolled. New base prices and differentials will be set up that will abolish long-used terminology and methods in ordering sheet steel. The change is to take effect May 1.

Meanwhile, sheets have shown continued weakness in some districts. Sharp competition in the South has brought galvanized sheets down to a range of 2.80c. to 2.90c., a decline of \$2 to \$4 a ton from recent levels, with some business taken at 2.70c. Although 2.25c., Pittsburgh, remains nominal on black sheets, sales have been made in the Detroit district and in the East at \$1 to \$2 lower. Price weakness extends to semi-finished steel.

Lake Superior iron ore prices have been reestablished at last year's levels on the basis of several sales, the first of the season. The Ford Motor Co., which inquired for 390,000 tons, bought 160,000 tons, but will make no further purchases unless conditions change later in the year.

THE IRON AGE composite prices for finished steel and pig iron are unchanged.

PITTSBURGH

Steel Operations Ease Off Slightly— 35,000 Tons for Pipe Line Placed

PITTSBURGH, April 21.—The local steel industry has marked time in the last few days, with interest of both producers and consumers centered largely in outside business developments. Declining stock prices have cast a gloom over the picture, and lack of interest in steel requirements on the part of consumers has been followed by less sales pressure on the part of producers.

Prices are generally unsatisfactory, and operations have declined to a point at which the slightly increased tonnage which might be had by price shading would not allow any decided reduction in cost. On certain forms of flat-rolled steel, present quotations are said to be as much as \$8 a ton under the cost of production.

Pipe line activity is still a feature of the market, and a Pittsburgh producer has taken 35,000 tons of 12-in. seamless pipe for a large oil company. No other definite awards are reported, but inquiry is active, and more business is expected in the near future. Barge buying is also an important factor in the market. A local builder has taken from a Cleveland coal company 30 barges, which will require 4500 tons of steel. Barge builders estimate that at least 15,000 tons of steel products will be required for river craft now actively being negotiated.

No definite indications have appeared to reflect the trend of automobile requirements during May. Mills in this district have received few releases for shipment that far in the future, and it will be another week before May automotive production schedules will be fully reflected in steel specifications. Agricultural implement makers have increased their requirements slightly, and demand for road mesh and merchant wire products is well sustained.

Steel ingot production in the Pittsburgh district has eased off fractionally, and is now estimated at 47 per cent of capacity. The larger producers have curtailed output slightly, while the smaller independents have been able to maintain production. In the Wheeling district raw steel output is unchanged at 55 per cent, while Valley operations are fairly well held.

Tin plate production has fallen off slightly, with two large producers reporting slight decreases in output. Current specifications indicate that this decline is only temporary. Sheet and strip operations are lower, and bar production is barely sustained by current orders. Rail mill activity has ceased to reflect seasonal improvement, but no definite curtailment is reported.

The bar price is becoming better established at 1.65c., Pittsburgh,

▲ ▲ ▲
Pipe line activity and barge buying continue to feature steel demand.

* * *

Steel bar prices are becoming better established at 1.65c. a pound.

* * *

Agricultural implement makers have increased their takings slightly.

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Reduced production of tin plate regarded as temporary.

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Steel scrap grows weaker, without however definitely lower quotations.

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with a number of small lots bringing 1.70c. On the other hand, reinforcing bars are weak, particularly when lump sum bids are encountered. Plates and shapes are nominal at 1.65c., Pittsburgh, and sheet quotations show no definite decline. On the other hand, hot-rolled strip is more freely quoted at \$1 a ton under recent levels. Quotations on line pipe are decidedly weak, with the other forms of tubular material well sustained.

No change is reported in the raw materials market, although scrap continues weak and concessions have been offered in recent sales of semi-finished material. The pig iron market is dull and unchanged in price.

SEMI-FINISHED STEEL

Shipments so far this month are falling about 10 per cent behind March. Little buying is reported, but the \$30, Pittsburgh, price on billets, slabs and sheet bars has been shaded in some instances. Forging billets continue at \$36, with specifications fair. Producers of wire rods are holding to \$37, Pittsburgh, on the occasional spot orders being placed.

PIG IRON

The market has been quiet in the last week, with no important sales reported. Shipments are light, and only one producer is able to move its entire current make from week to week. No change in prices is reported. Recent sales of foundry have been made at \$17, Valley furnace. Bessemer

and malleable iron are quoted at the same price.

Prices per gross ton, f.o.b. Valley furnace:	
Basic	\$16.50 to \$17.00
Bessemer	17.00
Gray forge	16.50
No. 2 foundry	17.00
No. 3 foundry	16.50
Malleable	17.00
Low phos., copper free	26.66 to 27.00

Freight rate to Pittsburgh or Cleveland district, \$1.76.

Prices per gross ton f.o.b. Pittsburgh district furnace:

Basic	\$17.00 to \$17.50
No. 2 foundry	17.50
No. 3 foundry	17.00
Malleable	17.50
Bessemer	17.50

Freight rates to points in Pittsburgh district range from 63c. to \$1.13.

RAILS AND TRACK SUPPLIES

While specifications for track accessories are holding up fairly well, rail releases have failed to show improvement, and current production is barely maintained. Under present circumstances the prospect for next month is hardly as good as it was for April.

BARS, PLATES AND SHAPES

This market is being influenced more and more by spring activity in the heavy construction industry. Considerable bridge and highway work is before the trade, and releases on shapes and reinforcing bars are gradually expanding. Allegheny County took bids April 21 on a bridge over the Youghiogheny River at Boston, Pa., requiring 2000 tons of shapes. A bridge in Pittsburgh will take 450 tons, and several bridges in West Virginia are soon to come out. The Pennsylvania Railroad has postponed lettings on 8400 tons of reinforcing bars, on which bids were taken a short time ago. The barge market continues active. A Cleveland coal company has awarded 30 barges, requiring 4500 tons, of plates and shapes, to a Pittsburgh interest. This same builder has also taken a contract for two Government dredges, requiring 1500 tons of steel. Several smaller awards are reported, and fully 15,000 tons of steel will be required for barge work now active. Demand for plates from the barge builders is helping to offset the light requirements of railroad car makers and fabricators of steel tanks. Merchant bars are quiet, with little improvement reported from the automobile industry.

Prices are still rather spotty, with quotations on reinforcing bars especially weak. While the base price of 1.65c., Pittsburgh, is fairly well maintained, distributors are making low quotations in lump sum bids with a disturbing effect on the market. The

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous,
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron, Per Gross Ton:	Apr. 21, 1931	Apr. 14, 1931	Mar. 24, 1931	Apr. 22, 1930
No. 2 fdy., Philadelphia.....	\$17.76	\$17.76	\$17.76	\$20.26
No. 2, Valley furnace.....	17.00	17.00	16.50	18.50
No. 2 Southern, Cin'tl.....	14.19	14.19	14.19	16.69
No. 2, Birmingham.....	12.00	12.00	12.00	14.00
No. 2 foundry, Chicago*.....	17.50	17.50	17.50	19.50
Basic, del'd eastern Pa.....	17.00	17.25	17.25	18.75
Basic, Valley furnace.....	16.50	16.50	16.50	18.50
Valley Bessemer, del'd P'gh..	18.76	18.76	18.76	20.76
Malleable, Chicago*.....	17.50	17.50	17.50	19.50
Malleable, Valley.....	17.00	17.00	17.00	19.00
L. S. charcoal, Chicago.....	25.04	25.04	25.04	27.04
Ferromanganese, seaboard...	80.00	80.00	80.00	94.00

Rails, Billets, etc., Per Gross Ton:	Apr. 21, 1931	Apr. 14, 1931	Mar. 24, 1931	Apr. 22, 1930
Rails, heavy, at mill.....	\$43.00	\$43.00	\$43.00	\$43.00
Light rails at mill.....	36.00	36.00	36.00	36.00
Re-rolling billets, Pittsburgh..	30.00	30.00	30.00	33.00
Sheet bars, Pittsburgh.....	30.00	30.00	30.00	33.00
Slabs, Pittsburgh.....	30.00	30.00	30.00	33.00
Forging billets, Pittsburgh...	36.00	36.00	36.00	38.00
Wire rods, Pittsburgh.....	35.00	35.00	35.00	38.00

	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb...	1.65	1.65	1.60	1.85

Finished Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh.....	1.65	1.65	1.65	1.80
Bars, Chicago.....	1.75	1.75	1.70	1.90
Bars, Cleveland.....	1.70	1.70	1.70	1.80
Bars, New York.....	1.98	1.98	1.98	2.14
Tank plates, Pittsburgh.....	1.65	1.65	1.65	1.80
Tank plates, Chicago.....	1.75	1.75	1.70	1.90
Tank plates, New York.....	1.93	1.93	1.93	2.02 1/2
Structural shapes, Pittsburgh..	1.65	1.65	1.65	1.80
Structural shapes, Chicago.....	1.75	1.75	1.70	1.90
Structural shapes, New York...	1.90 1/2	1.90 1/2	1.90 1/2	1.99 1/2
Cold-finished bars, Pittsburgh	2.10	2.10	2.10	2.10
Hot-rolled strips, Pittsburgh..	1.55	1.55	1.55	1.70
Cold-rolled strips, Pittsburgh..	2.25	2.25	2.25	2.55

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Finished Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 24, P'gh...	2.25	2.25	2.25	2.55
Sheets, black, No. 24, Chicago	2.35	2.35	2.35	2.65
dist. mill.....	2.85	2.85	2.85	3.30
Sheets, galv., No. 24, P'gh...	2.95	2.95	3.00	3.40
Sheets, galv., No. 24, Chicago	2.00	2.05	2.05	2.15
dist. mill.....	2.15	2.15	2.15	2.25
Wire nails, Pittsburgh.....	1.90	1.90	1.90	2.15
Wire nails, Chicago dist. mill..	1.95	1.95	1.95	2.25
Plain wire, Pittsburgh.....	2.20	2.20	2.20	2.40
Plain wire, Chicago dist. mill..	2.25	2.25	2.25	2.45
Barbed wire, galv., Pittsburgh	2.55	2.55	2.55	2.95
Barbed wire, galv., Chicago	2.60	2.60	2.60	3.00
dist. mill.....	2.60	2.60	2.60	3.00
Tin plate, 100 lb. box, P'gh...	\$5.00	\$5.00	\$5.00	\$5.25

Old Material, Per Gross Ton:

Heavy melting steel, P'gh...	\$12.25	\$12.25	\$12.75	\$15.75
Heavy melting steel, Phila...	10.25	10.25	10.50	13.75
Heavy melting steel, Ch'go...	9.75	10.00	10.00	13.00
Carwheels, Chicago.....	9.50	9.50	9.50	14.50
Carwheels, Philadelphia.....	12.50	12.50	13.50	15.00
No. 1 cast, Pittsburgh.....	12.25	12.25	12.50	14.50
No. 1 cast, Philadelphia.....	11.50	11.50	11.50	15.00
No. 1 cast, Ch'go (net ton)...	9.50	9.50	9.50	13.50
No. 1 RR. wrot., Phila.....	11.00	11.00	12.00	15.00
No. 1 RR. wrot., Ch'go (net)...	8.25	8.25	8.25	11.75

Coke, Connellsville,

Per Net Ton at Oven:	Cents	Cents	Cents	Cents
Furnace coke, prompt.....	\$2.50	\$2.50	\$2.50	\$2.60
Foundry coke, prompt.....	3.50	3.50	3.50	3.50

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York.....	9.87 1/2	10.12 1/2	10.12 1/2	14.12 1/2
Electrolytic copper, refinery...	9.50	9.75	9.75	13.75
Tin (Strait), New York.....	24.62 1/2	25.60	26.90	35.87 1/2
Zinc, East St. Louis.....	3.62 1/2	3.80	4.00	4.75
Zinc, New York.....	3.97 1/2	4.15	4.35	5.10
Lead, St. Louis.....	4.25	4.25	4.25	5.40
Lead, New York.....	4.50	4.50	4.50	5.50
Antimony (Asiatic), N. Y....	6.85	6.90	7.25	7.75

1.70c. price on bars, plates and shapes is subject to little test, and is still not regarded seriously by consumers, who are largely covered for the quarter at 1.65c. or lower.

COLD-FINISHED STEEL BARS

Demand continues very dull, and shipments are running at least 10 per cent under the corresponding March period. Fairly stable prices are the most encouraging feature of the market. Cold-finished bars are quoted at 2.10c., Pittsburgh.

TUBULAR GOODS

The Sinclair Oil Co. is reported to have placed 160 miles of 12-in. seamless pipe with a Pittsburgh district maker. No other line pipe orders are reported, but a number are still in immediate prospect. A Pittsburgh maker will also be awarded the tonnage now in prospect from the Shamrock Natural Gas Co. if the line is decided upon. This will amount to 45,000 tons. The pipe market in Texas is

disturbed by proration activities, as well as an effort on the part of the railroads to have pipe line companies classified in that State as common carriers. Decisions on both subjects are expected in the near future. Oil country goods are very quiet, and demand for butt-weld material is improving only in a very limited way. Mechanical tubing and boiler tubes are dull, but prices are well maintained, which is more than can be said in the case of line pipe.

WIRE PRODUCTS

Shipments of barbed wire and fencing to the agricultural industry continue to improve, and weather conditions in the past week have been ideal for such business. Demand for road mesh is also active, and wire mills are increasing their production at several points. Manufacturers' wire is still rather dull, and nails are very quiet. Manufacturers' wire is currently quoted at 2.30c., Pittsburgh, and nails at \$2 a keg. In both cases

these figures represent the spot market only.

STRIP STEEL

Scarcely any buying by the automobile companies for May shipment is reported by local strip makers, and the market seems even duller than before. Makers of office equipment, builders' hardware and other products for which strip is used are buying strictly from hand to mouth and have very light requirements. Prices on hot-rolled material are weak, with concessions of \$1 a ton common in a number of consuming centers. Hot-rolled strip 6 in. and wider is quotable at 1.50c. to 1.55c. and the narrow widths at 1.60c. to 1.65c. Cold-rolled material is fairly well maintained at 2.25c., Pittsburgh.

TIN PLATE

Two large makers of tin plate reduced their production schedules slightly last week, and operations in the industry as a whole have fallen

THE IRON AGE COMPOSITE PRICES

Finished Steel		Pig Iron	Steel Scrap
April 21, 1931	2.12Sc. a Lb.	\$15.79 a Gross Ton	\$10.75 a Gross Ton
One week ago	2.12Sc.	15.79	10.83
One month ago	2.12Sc.	15.71	11.08
One year ago	2.264c.	17.75	14.17
Based on steel bars, beams, tank plates, wire, rails, black pipe and sheets. These products make 87 per cent of the United States output.		Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	
Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.			
High		High	Low
1931.....	2.142c., Jan. 13; 2.121c., Jan. 6	\$15.90, Jan. 6; \$15.71, Feb. 17	\$11.33, Jan. 6; \$10.75, April 21
1930.....	2.362c., Jan. 7; 2.121c., Dec. 9	18.21, Jan. 7; 15.90, Dec. 16	15.00, Feb. 18; 11.25, Dec. 9
1929.....	2.412c., April 2; 2.362c., Oct. 29	18.71, May 14; 18.21, Dec. 17	17.58, Jan. 29; 14.08, Dec. 3
1928.....	2.391c., Dec. 11; 2.314c., Jan. 3	18.59, Nov. 27; 17.04, July 24	16.50, Dec. 31; 13.08, July 2
1927.....	2.453c., Jan. 4; 2.293c., Oct. 25	19.71, Jan. 4; 17.54, Nov. 1	15.25, Jan. 11; 13.08, Nov. 22
1926.....	2.453c., Jan. 5; 2.403c., May 18	21.54, Jan. 5; 19.46, July 13	17.25, Jan. 5; 14.00, June 1
1925.....	2.560c., Jan. 6; 2.396c., Aug. 18	22.50, Jan. 13; 18.96, July 7	20.83, Jan. 13; 15.08, May 5

under 80 per cent. However, it is not believed that the seasonal peak has been reached, and current specifications indicate further improvement in the near future. Tin plate is quoted at \$5 a base box, Pittsburgh.

SHEETS

Specifications for sheet steel have not changed materially in the last week, and operations are still receding. The leading interest ran its mills last week at about 37 per cent of capacity, and the average for the industry is not above 40 per cent. While automotive demand is still very disappointing, a few companies are maintaining good schedules, and sheet makers who cater to their needs are running much better than others. General demand for sheets is rather quiet, although specifications from farm implement makers have increased slightly, and culvert manufacturers are taking heavy tonnages. Electrical sheets are quiet, although better business is in prospect. Makers of radios and electric refrigerators have both reduced their needs. Prices continue weak, with no specific changes reported in the last few days. Black sheets are holding fairly well at 2.25c., Pittsburgh, and galvanized at 2.80c. to 2.90c. On auto body material 3.10c., Pittsburgh, now represents the general market. A leading producer has announced changes in nomenclature for sheets, with a new set-up of differentials. Details will be found elsewhere in this issue.

COKE

No change is reported in this market, with furnace coke weak at \$2.50, Connellsville. In the East lower figures are reported. The foundry grade is very quiet, with shipments no heavier than they were in March.

OLD MATERIAL

The scrap market has continued to grow weaker, although quotations are not definitely lower except on a few grades. One mill bought a small

tonnage of hydraulic compressed sheets at \$12.25, a decline of 25c. a ton from the last reported quotation. While no No. 1 steel purchases have been reported, dealers are having no difficulty in buying material at \$12, and the \$12.50 selling price might be shaded if a buyer could be found. No. 2 steel is weaker. While blast furnace scrap has been bought by a consumer at as low as \$7.25, another purchase at \$8 makes the quotable spread wider than usual.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel..	\$12.00 to \$12.50
No. 2 heavy melting steel..	10.75 to 11.25
Scrap rails	12.00 to 12.50
Compressed sheet steel....	11.75 to 12.25
Bundled sheets, sides and ends	10.50 to 11.00
Cast iron carwheels.....	13.00 to 13.50
Sheet bar crops, ordinary..	13.00 to 13.50

Warehouse Prices, f.o.b. Pittsburgh

*Base per Lb.	
Plates	2.85c.
Structural shapes	2.85c.
Soft steel bars and small shapes...	2.75c.
Reinforcing steel bars.....	2.75c.
Cold-finished and screw stock—	
Rounds and hexagons.....	3.35c.
Squares and flats	3.85c.
Bands	3.10c.
Hoops	4.10c.
Black sheets (No. 24), 25 or more bundles	3.25c.
Galv. sheets (No. 24), 25 or more bundles	3.60c.
Light plates, blue annealed (No. 10)	2.75c. to 3.00c.
Blue annealed sheets (No. 13)	2.90c. to 3.05c.
Galv. corrug. sheets (No. 28), per square (less than 3750 lb.).....	3.82c.
Spikes, large.....	2.65c.
Small	2.90c. to 3.05c.
Boat	3.15c.
Track bolts, all sizes, per 100 count, 60 and 10 per cent off list	
Machine bolts, 100 count, 60 and 10 per cent off list	
Carriage bolts, 100 count, 60 and 10 per cent off list	
Nuts, all styles, 100 count, 60 and 10 per cent off list	
Large rivets, base per 100 lb.....	\$3.30
Wire, black, soft ann'l'd, base per 100 lb.	2.40
Wire, galv. soft, base per 100 lb.....	2.85
Common wire nails, per keg.....	\$2.10 to 2.15
Cement coated nails, per keg.....	2.15

*On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 3999 lb.

Heavy breakable cast.....	9.00 to 9.50
No. 2 railroad wrought....	12.00 to 12.50
Hvy. steel axle turnings....	10.00 to 10.50
Machine shop turnings....	7.00 to 7.50

Acid Open-Hearth Grades:	
Railr. knuckles and couplers	15.50 to 16.00
Railr. coil and leaf springs	15.50 to 16.00
Rolled steel wheels.....	15.50 to 16.00
Low phos. billet and bloom ends	17.50 to 18.00
Low phos. mill plates.....	14.00 to 15.00
Low phos. light grades....	14.00 to 15.00
Low phos. sheet bar crops	15.50 to 16.00
Heavy steel axle turnings.	10.00 to 10.50

Electric Furnace Grades:	
Low phos. punchings.....	15.00 to 15.50
Heavy steel axle turnings.	10.00 to 10.50

Blast Furnace Grades:	
Short shoveling steel turnings	7.00 to 8.00
Short mixed borings and turnings	7.00 to 8.00
Cast iron borings.....	7.00 to 8.00

Rolling Mill Grades:	
Steel car axles.....	17.50 to 18.00

Cupola Grades:	
No. 1 cast.....	12.00 to 12.50
Rails 3 ft. and under.....	14.00 to 14.50

Baldwin Locomotive Co., Eddystone, Pa., has purchased assets of Whitcomb Locomotive Co., Rochelle, Ill., through Guy Bush, receiver, for \$275,000, and will reorganize as the Whitcomb Locomotive Works, Inc., under the Delaware laws. Purchasers assume \$100,000 bonded indebtedness.

Ohio Locomotive Crane Co., Bucyrus, Ohio, has appointed F. H. Hopkins & Co., Ltd., Montreal and Toronto, as agent in Eastern Canada for its line of locomotive cranes, pile drivers, excavators and tractor dump wagons.

EDWARD O. OTIS, JR., Boston, merchandising adviser of the Associated Industries of Massachusetts, and C. W. WHITNEY, San Francisco, executive secretary of the Purchasing Agents' Association of Northern California, have been appointed Massachusetts and California representatives respectively of the American Standards Association. They will serve as contact points between the industries of their States and the association.

CHICAGO

Sales Remain in Fair Volume With Most Promise in Pipe

CHICAGO, April 21.—Whether or not governing factors are seasonal, the tone of the Chicago iron and steel market is distinctly less favorable than at mid-April. Sales of finished steel products are in fair volume, considering business as a whole and also considering the fact that selling was stimulated by announcements of price advances at the opening of the quarter. However, the true measure of the drift of the market is given by current specifications, which will not long support present ingot output. This is a shade above the 50 per cent of capacity mark, a drop of at least 4 points in about seven days.

The use of rails is progressing about as expected when general shipping schedules were made at the opening of the movement. The market has none of the snap usually occasioned by rush orders and changes requiring faster deliveries.

Smaller shipments of pig iron have checked the upward movement of this commodity, and with the first three weeks of April as a gage, average daily shipments are not above the March rate.

The structural market has been showing up better of late, but there is growing apprehension among fabricators that a number of private undertakings are not on solid financial ground and that they may have to lean heavily on public work.

Scrap dealers are facing an uncertain situation. This arises from curtailed consumption and freer inflow of tonnage as a result of the season and the liquidation of accumulations which were originally acquired for speculative purposes.

A glance at the oil and gas line market is encouraging. A pipe tonnage has been placed for a gas line in Michigan, and from east Texas comes the news that 35,000 tons of pipe has been ordered.

PIG IRON

The melt in this district is less regular and the rate of shipment of Northern foundry iron is pointing downward. The change is sufficient to indicate that the total tonnage moved in April will not exceed that shipped in the previous month. There still are calls for prices, which is rather natural as buying did not develop near the end of the first quarter. Sellers of Southern iron continue to quote \$11 a ton, Birmingham, or \$17.01, delivered all rail to Chicago. Charcoal iron is quiet with prices holding in the range of present quotations. The silvery market is occasionally brought to life by an inquiry. However, these

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Steel buying, with no rush orders, lacks snap.

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Operations have receded to about 50 per cent of ingot capacity.

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Pipe line tonnage has been placed for Michigan and for eastern Texas.

* * *

Rains over wide areas have improved sentiment that may be reflected in better wire demand.

* * *

Shipments of pig iron not likely to exceed those of March.

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often do not develop beyond the feeler stage, as lots bought are much smaller than those mentioned in the request for prices.

Prices per gross ton at Chicago:

N'th'n No. 2 fdy., sil. 1.75 to 2.25	\$17.50
N'th'n No. 1 fdy., sil. 2.25 to 2.75	18.00
Malleable, not over 2.25 sil. High phosphorus	17.50
Lake Super. charcoal, sil. 1.50	\$25.04 to 27.04
S'th'n No. 2 fdy.	17.01
Low phos., sil. 1 to 2, cop-per free	28.50 to 29.20
Silvery, sil. 8 per cent.	26.79
Bess. ferrosilicon, 14-15 per cent	35.79

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

FERROALLOYS

Specifications from steel foundries are showing a slight increase as demand drops from steel mills that are lowering rolling schedules. This market is very quiet from the viewpoint of new buying.

CAST IRON PIPE

Demand for cast iron pipe is still in fair volume, and prospects for the future can be regarded as satisfactory. Specifications from public utilities are far less than this industry is accustomed to issue at this time of year, but they are in line with contracts which are smaller than usual. The thought has been expressed in the trade that public utilities will be in need of additional pipe before the year is out and that another buying movement may develop. There is rather a steady run of small busi-

ness. In prospect in the immediate Chicago territory is a large tonnage for a waterworks development. Audubon, Iowa, is in the market for 11,000 ft. of 10-in. pipe, and Jackson, Mich., will open bids April 27 on 700 tons of 6 to 24-in. pipe. American Cast Iron Pipe Co. has taken 11,000 ft. of 6 and 10-in. pipe for Hastings, Neb. The recent change in Chicago's city administration is holding a check on the formal contract for 500 tons of 20-in. pipe, on which Glamorgan Pipe & Foundry Co. was low bidder at \$33 a ton, Birmingham. It is reported that pipe foundries are operating five and in some cases six days a week.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over \$43 to \$44; 4-in., \$46 to \$47; Class A and gas pipe, \$3 extra.

RAILS AND TRACK SUPPLIES

Of special interest this week is a purchase of 9000 tons of rails from the Colorado mill by the Great Northern for its Oregon extension, which will connect the Great Northern tracks with those of the Western Pacific. Otherwise, the rail market is quiet, with rolling schedules at about the same level as last week. About 1000 tons of track supplies has been placed on order, and specifications are a shade heavier than a week ago. There are no indications yet of a secondary rail buying movement, a situation which mills earnestly hope for in view of the limited size of contracts placed for the current year.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 2.40c. to 2.50c.; No. 24 galv., 3.00c. to 3.10c.; No. 10 blue ann'l'd, 2.00c. to 2.10c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

PLATES

Activity in steel tanks has not carried through. The inquiry for 3000 tons noted last week is active, but no additional tonnage has come out for figures. Specifications from fabricators are rather light but fairly steady. Some improvement is noted in the steel pipe market. Shipments of skelp have changed little in recent weeks, and programs indicate little variation for the near future. Republic Steel Corp. will furnish about 14 miles of 4-in. high-pressure gas line for the Michigan Gas & Electric Co. Construction has been started on the last 155 miles of 26-in. pipe for gas delivery from Texas to Chicago, and there is already talk of the prospect of the second line being put under construction in 1931. Public

utilities are in general releasing larger tonnages, and the movement of pipe to jobbers is decidedly improved. The railroad car market is dormant again after having made a recent start in the form of a few small orders.

SHEETS

Demand for sheets is following an irregular course. About a week ago shipments started to climb but recently specifications have grown lighter. There is as yet no snap to the roofing trade and jobbers' needs are at least momentarily less urgent. Production is under 50 per cent of capacity, with one unit not above 30 per cent. Galvanized sheets are moving freely at 2.90c. to 3c. a pound, Chicago district mill.

Prices f.o.b. mill, per gross ton: Standard section open-hearth and Bess. rails, \$43; light rails, rolled from billets, \$36. *Per lb.:* Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.80c.; steel tie plates, 1.95c.; angle bars, 2.75c.

BOLTS, NUTS AND RIVETS

After taking into consideration the spottiness of the market, there is still in evidence a drop in current specifications. This is sufficiently marked that if the trend continues April shipments will fall under the March volume. Jobbers who sell to industries, especially in farm implement manufacturing districts, report a decided falling off in business. Jobbers who supply shelf hardware in rural sections find demand about steady.

WIRE PRODUCTS

Demand is showing little variation. Barbed wire and woven wire fencing are moving in fair volume but under the rate of a year ago. The demand for nails is steady but small, which some believe points to only a comparatively quiet construction period. Heavy rains have fallen over most of the plains country and to the east of the Mississippi Valley, thereby improving the general feeling in those sections. Prices are fairly steady. Instances of concessions offered are not numerous.

BARS

Scattered inquiries for mild steel bars are growing more numerous, and in some cases releases are somewhat larger. Specifications entered in recent days are heavier and in the aggregate bulk larger than shipments in the same interval. The alloy steel bar movement has not regained the ground it lost a week or 10 days ago, when demand from the automobile trade slackened. However, a tractor plant which had expected to shut down has received a large order from Russia which may be expected to react to the benefit of the bar market. Iron bars mills have very unsatisfactory schedules as demand continues light. Use of rail steel bars is shrinking in spite of the fact that demand from the bed industry is steady and

barn equipment manufacturers are showing more interest. Demand for fence posts, after turning upward, has declined sharply, as dealers find that movement from stocks is not as heavy as had been expected.

WAREHOUSE BUSINESS

Volume of new orders for the past two weeks has been steady at the rate of increased flow registered late in March and at the opening of the current month. Individual orders are still very small, and they come at frequent intervals. On the whole, the situation is not satisfactory to warehousemen, except from the viewpoint of prices, which are steady.

STRUCTURAL MATERIAL

Small tonnages up for figuring are still on the increase, but shops are hungry and prices for fabricated material are irregular and low. New contracts call for 5000 tons of steel, including 3500 tons for a hotel at Oklahoma City. Fresh inquiries will take 4000 tons, most of which will be used for bridges and viaducts. The most active jobs that are slated to be let in Chicago and nearby within the next few days are the Outer Bridge, requiring 6000 tons, and the new Trier high school addition, Winnetka, Ill., which will take upward of 800 tons. Increasing interest in the use of steel frames for residences is shown by an inquiry for about 100 tons for a house to be built in Wilmette, Ill.

COKE

Shipments have grown more irregular and are in somewhat less total volume. Prices are steady at \$8 a ton, f.o.b. local ovens.

OLD MATERIAL

Prices for scrap iron and steel have declined after several weeks of comparative steadiness. A steel mill is reported to have taken heavy melting steel at \$10 a gross ton delivered,

which is a reduction of 25c. Other offers at this figure have been turned down. A consumer of hydraulic sheets is unattracted by offerings at reduced prices. In fact, there are few consumers who are interested in scrap unless they have immediate need for it. Railroad lists, though light at the moment, are receiving less attention from bidders, who not only are bidding lower for tonnages offered, but who quite frequently hesitate to commit themselves because tonnages appearing on track are difficult to place. Steel mills are taking lighter shipments. Some dealers have orders for heavy melting steel, which at the current rate of releases would take them from three to four months to complete.

*Prices deliv'd Chicago district consumers:
Per Gross Ton*

Basic Open-Hearth Grades:	
Heavy melting steel.....	\$9.50 to \$10.00
Shoveling steel.....	9.50 to 10.00
Frogs, switches and guards, cut apart, and misc. rails	9.75 to 10.25
Factory hyd. comp. sheets	7.50 to 8.00
Drop forge flashings.....	6.25 to 6.75
No. 1 busheling.....	7.25 to 7.75
Forg'd cast and r'd steel carwheels.....	11.75 to 12.25
Railroad tires, charg. box size.....	11.75 to 12.25
Railroad leaf springs cut apart.....	11.75 to 12.25
Axle turnings.....	8.00 to 8.50
Acid Open-Hearth Grades:	
Steel couplers and knuckles.....	10.50 to 11.00
Coil springs.....	12.00 to 12.50
Electric Furnace Grades:	
Axle turnings.....	8.00 to 8.50
Low phos. punchings.....	10.75 to 11.25
Low phos. plates, 12 in. and under.....	11.00 to 11.50
Blast Furnace Grades:	
Cast iron borings.....	4.50 to 4.75
Short shoveling turnings.....	4.25 to 4.75
Machine shop turnings.....	4.25 to 4.75
Rolling Mill Grades:	
Rerolling rails.....	11.75 to 12.25
Cupola Grades:	
Steel rails, less than 3 ft.....	11.00 to 11.50
Steel rails, less than 2 ft.....	12.00 to 12.50
Angle bars, steel.....	10.50 to 11.00
Cast iron carwheels.....	9.50 to 10.00
Malleable Grades:	
Railroad.....	11.25 to 11.75
Agricultural.....	10.75 to 11.00
Miscellaneous:	
*Relaying rails, 56 to 60 lb.....	19.00 to 21.00
*Relaying rails, 65 lb. and heavier.....	22.00 to 27.00

Per Net Ton

Rolling Mill Grades:	
Iron angle and splice bars.....	9.75 to 10.25
Iron arch bars, and transoms.....	10.50 to 11.00
Iron car axles.....	18.00 to 19.00
Steel car axles.....	12.50 to 13.00
No. 1 railroad wrought.....	8.25 to 8.75
No. 2 railroad wrought.....	8.25 to 8.75
No. 1 busheling.....	6.00 to 6.50
No. 2 busheling.....	4.00 to 4.50
Locomotive tires, smooth.....	11.50 to 12.50
Pipes and flues.....	5.50 to 6.00
Cupola Grades:	
No. 1 machinery cast.....	9.50 to 10.00
No. 1 railroad cast.....	8.00 to 8.50
No. 1 agricultural cast.....	7.75 to 8.25
Stove plate.....	6.75 to 7.25
Grate bars.....	6.75 to 7.25
Brake shoes.....	7.50 to 8.00

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

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The semi-annual meeting of the American Society of Mechanical Engineers in 1932 will be held at Bigwin, Ont., as part of a joint meeting of the Institution of Mechanical Engineers (Great Britain) and the Engineering Institute of Canada.

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes.....	3.00c.
Soft steel bars.....	2.90c.
Reinforcing bars, billet steel.....	2.00c.
Rail steel reinforcement.....	1.50c. to 1.75c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons.....	3.35c.
Flats and squares.....	3.85c.
Bands, $\frac{3}{8}$ in. (in Nos. 10 and 12 gages).....	3.10c.
Hoops (No. 14 gage and lighter).....	3.65c.
Black sheets (No. 24).....	3.80c.
Galv. sheets (No. 24).....	4.35c.
Blue ann'l'd sheets (No. 10).....	3.35c.
Spikes ($\frac{3}{8}$ in. and larger).....	3.45c.
Track bolts.....	4.30c.
Rivets, structural.....	4.00c.
Rivets, boiler.....	4.00c.
Per Cent Off List	
Machine bolts.....	60 and 10
Carriage bolts.....	60 and 10
Coach and lag screws.....	60 and 10
Hot-pressed nuts, sq., tap. or blank.....	60 and 10
Hot-pressed nuts, hex., tap. or blank.....	60 and 10
No. 8 black ann'l'd wire, per 100 lb.....	\$3.45
Com. wire nails, base per keg.....	2.30
Cement c'd nails, base per keg.....	2.30

CLEVELAND

Spurt in Steel Buying for Automobile Industry; Other Business Declines

CLEVELAND, April 21.—There was a spurt of activity in steel business from the motor car industry during the past week. This was largely in sheets. Otherwise, orders were light and generally showed a slight downward tendency. Buying by the motor car industry was for May requirements. Builders of medium and high-priced cars are feeling their way along and making purchases cautiously. In the low-priced class, the Chevrolet Motor Co. placed steel for a production in May that will equal or slightly exceed that of April, but tonnage from the Ford Motor Co. is declining.

Steel plant operations in Cleveland are unchanged this week at 56 per cent of ingot capacity. There has been some curtailment in local finishing mill operations in sheets and strip steel. The Marion Steam Shovel Co. has taken an order for a number of steam shovels for the Boulder Dam project and this is bringing out releases of a fair tonnage of steel. Demand for metal-working industries generally continues light, with orders limited to small lots. Manufacturers of concrete mixers are very busy, but demand for steel for road building machinery has declined. As this will be a very dull season in the Lake trade, the prospects of business for the Lake shipyards are not promising. Aside from an unsettled price situation on sheets, prices are well maintained.

PIG IRON

There is not much new business or inquiry. Sales in this territory during the week were limited to a few small lots and the only sizable inquiry pending is for 500 tons. Shipping orders for basic iron have declined as the result of falling off in orders for steel from the motor car industry, but shipments of foundry and malleable iron are holding up to recent volume. Business with most jobbing foundries continues dull. Prices of foundry and malleable iron are unchanged at \$16 to \$17, Lake furnace, for Ohio and Indiana, \$17 to \$17.50 for Michigan delivery, and \$17, Cleveland, for local delivery.

Prices per gross ton at Cleveland:
N'th'n fdy., sil. 1.75 to 2.25 \$17.00
S'th'n fdy., sil. 1.75 to 2.25 \$16.51 to 17.01
Malleable 17.50
Ohio silvery, 8 per cent. 25.00
Stand. low phos., Valley... 27.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 50c. average local switching charge; \$3 from Jackson, Ohio; \$6.01 from Birmingham.

IRON ORE

Lake ore prices were reestablished for the present year on several sales

made during the week. The Ford Motor Co., which inquired for 390,000 tons, bought 160,000 tons and will make no additional purchases this year unless conditions later in the season indicate that it will need more ore. The Ford company bought 100,000 tons of basic ore and the remainder in high phosphorus, except a small tonnage of lump ore. The business was divided among three ore firms. The Ford company will mine considerably more ore this year than heretofore in its own Blueberry mine on the Marquette range. Another open market sale of 100,000 tons has been made.

The outlook for the year in the ore trade is very unsatisfactory and the most optimistic predictions are that the movement will not exceed 40,000,000 tons. Some consumers who have long-term contracts have asked mining companies to allow them to take less ore this year than the minimum called for in their contracts, and it is not the policy of the ore people to compel consumers to take more ore than they can use. Some of the large open pit mines will not be placed in operation this season. Reaffirmed prices are: Mesabi, non-Bessemer, \$4.50; Mesabi Bessemer, \$4.65; Old Range Bessemer, \$4.80; Old Range non-Bessemer, \$4.65; high phosphorus, \$4.40, per gross ton.

Consumption of Lake ore in March was 2,835,439 tons, a gain of 467,196 tons over February, but much below the 4,628,438 tons used in March last year. Furnace stocks April 1 were 25,750,778 tons and the amount at furnaces and on Lake Erie docks on that date was 31,516,059 tons, or nearly 6,500,000 tons more than on the same date a year ago, when these stocks amounted to 24,877,276 tons. Central district furnaces consumed 1,383,856 tons in March, an increase of 257,595 tons over February. Lake front furnaces melted 1,393,331 tons,

a gain of 207,948 tons. All-rail furnaces used 39,127 tons, an increase of 1188 tons, and Eastern furnaces melted 19,115 tons, a gain of 465 tons. There were 102 furnaces using Lake ore in blast March 31, an increase of seven for the month.

BARS, PLATES AND SHAPES

Demand for the heavier rolled steel products continues rather slow. Not much bar tonnage is coming from the motor car industry. Forge and other shops serving that industry are supplied with steel for early needs. Mills are getting a moderate volume of plate orders, but they are for small lots. Inquiry in the building field is light. However, a great deal of highway bridge work continues to come out in New York and a few additional bridges in Ohio are out for bids. Merchant steel bars are quoted at a spread of 1.65c. to 1.70c., Cleveland, the lower price applying to some outside competitive points. Reinforcing bars, while untested, are not above 1.65c., Cleveland. With no new business in large enough lots to test the market, prices on plates and shapes are steady at 1.65c., Pittsburgh, with 1.70c. asked from consumers not having contracts.

STRIP STEEL

A round lot of hot-rolled strip was purchased by the local Fisher Body plant during the week, but demand from other sources was rather slow and there was some curtailment of mill operations. While wide strip is quoted at a spread of 1.50c. to 1.55c., Pittsburgh, the higher price is being frequently quoted, the lower price evidently being limited to some of the larger consumers in the automotive field. Cold-rolled strip is quiet and unchanged at 2.25c., Cleveland.

SHEETS

Several of the Michigan automobile manufacturers placed moderate-sized orders during the week covering their May requirements and the Fisher Body Corp. bought several thousand tons of sheets for its Cleveland plant for making Chevrolet bodies. These purchases resulted in an increase in bookings as compared with recent weeks. The Chevrolet body purchase was fully as large as those made during the past two or three months, and the tonnage bought was understood to be for a schedule of 100,000 bodies for May. This plant is now operating on a schedule of about 3000 bodies per day, seven days per week. While the Chevrolet company plans to at least maintain present production (Concluded on page 1410)

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and struc. shapes.....	2.95c.
Soft steel bars	2.85c.
Reinforc. steel bars.....	2.25c. to 2.50c.
Cold-fin. rounds and hex.....	3.40c.
Cold-fin. flats and sq.....	3.90c.
Hoops and bands, No. 12 to 14 in., inclusive	3.10c.
Hoops and bands, No. 13 and lighter	3.65c.
Cold-finished strip	5.95c.
Black sheets (No. 24).....	3.60c.
Galvanized sheets (No. 24).....	4.00c.
Blue ann'l'd sheets (No. 10).....	3.10c.
No. 9 ann'l'd wire, per 100 lb.....	\$2.35
No. 9 galv. wire, per 100 lb.....	2.80
Com. wire nails, base per keg.....	2.25

*Net base, including boxing and cutting to length.

NEW YORK

Price Weakness Continues on Some Steel Products—Pig Iron Buying Slow

NEW YORK, April 21.—Pig iron buyers are proceeding cautiously, contracting in most instances for only enough iron to cover work for which they obtain contracts. Notwithstanding the low prices, there is an almost complete absence of anything that might be considered speculative buying. Sales in the week probably did not exceed the 4500 tons booked in the previous week. The orders of a leading merchant seller have been running along from week to week at about an even level.

Transactions include upward of 1000 tons for a manufacturer in western New Jersey, 500 tons for an East Orange, N. J., plant for this quarter and the next, and 200 tons for a pump manufacturer's plant in Ohio, the latter order going to a Southern furnace.

Prices are unchanged at \$15 to \$16, Buffalo, and at \$11, Birmingham. Eastern Pennsylvania furnaces and the stack at Everett, Mass., are taking occasional orders at delivered prices equivalent to those on Buffalo iron.

Prices per net ton deliv'd New York: Water pipe, 6-in. and larger, \$34.90 to \$35.90; 4-in. and 5-in., \$37.90 to \$38.90; 3-in., \$44.90 to \$45.90. Class A and gas pipe, \$3 extra.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil. 1.75 to 2.25 \$19.91 to \$20.41
*Buff. No. 2, del'd east N. J. 18.28 to 18.78
East. Pa. No. 2 fdy., sil. 1.75 to 2.25 17.39 to 17.89
East. Pa. No. 2X fdy., sil. 2.25 to 2.75 17.89 to 18.39

Freight rates: \$4.91 from Buffalo, \$1.39 to \$2.52 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of \$3.28 a ton from Buffalo.

REINFORCING BARS

New projects requiring reinforcing bars are slow to develop, but there is a substantial tonnage of pending business, which distributors expect will be awarded in the next week or 10 days. Competition is keen and maintenance of prices is exceedingly difficult. On recent business 1.65c., Pittsburgh, or 1.99c., New York, has applied rather generally on less than carload lots, with concessions of \$1 to \$2 a ton offered by both distributors and mills for the more desirable tonnages.

CAST IRON PIPE

Transactions are generally limited to small lots of less than 100 tons, with little activity among municipalities. New York has awarded 2000 tons of water pipe for use in the Borough of Brooklyn to the United States Pipe & Foundry Co. and R. D. Wood & Co. The Government of the

Philippines is taking bids on 2000 tons of pressure pipe for installation at Cebu, P. I. Prices quoted on new pipe business continue irregular, medium-sized tonnages bringing quotations of \$32 to \$33 a net ton, Northern furnace.

FINISHED STEEL

Steel orders are running in smaller aggregate volume than in March. Consumers are taking only such steel as they have early use for, and prospective tonnage of interest seems to be coming up less frequently.

Prices of sheets and strip steel continue to show weakness. Wide hot-rolled strip is more commonly sold at 1.50c., Pittsburgh, though a good many users are buying in such small quantities that they are still quoted 1.55c. by some of the mills. Black sheets have been sold at less than 2.25c., Pittsburgh, while galvanized sheets continue to range from 2.80c. to 2.85c. Although some plate mills are quoting 1.75c. to 1.80c., Coatesville, for plates, sales have been made at 1.65c. to 1.70c.

WAREHOUSE BUSINESS

The movement of tonnage from stock promises to be slightly larger this month than in March, but is still well under the usual volume at this season. Prices are in most cases subject to concessions when a substantial order is placed, but with most of the

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and struc. shapes	2.70c. to 3.10c.
Soft steel bars, small shapes	2.70c. to 3.10c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons	3.40c.
Flats and squares	3.90c.
Cold-roll. strip, soft and quarter hard	4.95c.
Hoops	3.75c.
Bands	3.40c.
Blue ann'd sheets (No. 10)	3.00c. to 3.25c.
Black sheets (No. 24*)	3.50c.
Galvanized sheets (No. 24*)	4.00c.
Long terme sheets (No. 24)	5.00c.
Standard tool steel	12.00c.
Wire, black annealed	4.50c.
Wire, galv. annealed	5.15c.
Tire steel, ½ x ½ in. and larger	3.40c.
Smooth finish, 1 to 2½ x ¼ in. and larger	3.75c.
Open-hearth spring steel, bases	4.50c. to 7.00c.

No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

	Per Cent Off List
Machine bolts, cut thread:	
¾ x 6 in. and smaller	.65 to .65 and 10
1 x 30 in. and smaller	.65 to .65 and 10
Carriage bolts, cut thread:	
¾ x 6 in. and smaller	.65 to .65 and 10
¾ x 20 in. and smaller	.65 to .65 and 10
Boiler Tubes:	Per 100 Ft.
Lap welded, 2-in.	\$19.00
Seamless steel, 2-in.	20.25
Charcoal iron, 2-in.	26.25
Charcoal iron, 4-in.	67.00

buying small price shading is not common. Users of various products apparently prefer to place several small-lot orders in the course of a few weeks rather than to carry any stock.

OLD MATERIAL

All grades of scrap are inactive, except for small shipments of No. 1 heavy melting steel by barge to Buffalo, for which \$7.25 to \$7.50 a ton, New York, is being paid, and a small tonnage of machine shop turnings and yard steel moving to a consumer at Phoenixville, Pa. Eastern Pennsylvania consumers of No. 1 steel have substantial supplies on hand and are still postponing deliveries on contracts. The Sparrows Point mill has closed on a tonnage at \$9.50 a ton, delivered.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel	\$6.50 to \$7.50
Heavy melting steel (yard)	4.25 to 4.75
No. 1 hvy. breakable cast	6.75 to 7.50
Stove plate (steel works)	4.75
Locomotive grate bars	4.75
Machine shop turnings	3.00
Short shoveling turnings	3.00
Cast borings (blast fur. or steel works)	3.00
Mixed borings and turnings	3.00
Steel car axles	12.50 to 13.50
Iron car axles	16.50 to 17.00
Iron and steel pipe (1 in. dia., not under 2 ft. long)	7.25
Forge fire	5.50 to 6.00
No. 1 railroad wrought	8.75
No. 1 yard wrought, long	7.75
Rails for rolling	9.25 to 9.75
Stove plate (foundry)	5.50 to 6.00
Malleable cast (railroad)	8.50 to 9.00
Cast borings (chemical)	8.00 to 8.50

Prices per gross ton, deliv'd local foundries:

No. 1 machry. cast	\$12.50
No. 1 hvy. cast (columns, bldg. materials, etc.) ; cupola size	10.50
No. 2 cast (radiators, cast boilers, etc.)	10.00



Railroad Equipment

Minneapolis & St. Louis has ordered 100 flat cars from General American Car Co.

Sheffield Farms Co. has ordered 12 milk cars from General American Car Co.

Kansas City Southern has ordered four baggage-mail cars from Pullman Car & Mfg. Corp.

General Chemical Co. has ordered 15 steel, rubber lined, tank cars from American Car & Foundry Co.

Amtorg Trading Corp. has ordered 60 air dump cars from Magor Car Corp.

Central Supply Co., Philadelphia, has ordered 250 mine cars from an unnamed builder.

Toledo, Peoria & Western is inquiring for four locomotive tenders.

Delaware & Hudson is building 100 box cars and reconditioning about 350 other cars in its own shops.

PHILADELPHIA

Steel Prices Lack Firmness— Many Protections Extended

PHILADELPHIA, April 21.—While the volume of steel buying is smaller than during the latter part of the first quarter, the fact that consumer operations have shown but little change leads to the belief that the aggregate tonnage of steel purchases is likely to be fair, even though it may be spread out in small individual orders. Prices of certain products, especially sheets, lack stability. Black sheets at 2.25c., Pittsburgh, and galvanized at 2.85c., Pittsburgh, are being shaded \$1 a ton on desirable business and \$2 a ton occasionally to large preferred buyers. Steel bars at 1.65c., Pittsburgh, lack firmness, but, with most of the current buying limited to small lots, concessions are not common.

PIC IRON

Quotations on eastern Pennsylvania foundry iron continue at \$17 a ton, furnace, for orders of a few carloads, with 50c. a ton concessions granted on the larger lots, which appear only occasionally. Operating rates of foundries are being maintained, but buying by these consumers is only for immediate needs and prompt shipment of one or two carloads is usually specified. Southern pig iron producers are still quoting \$11 a ton, Birmingham, for small and medium-sized tonnages of foundry iron, but are reported to be accumulating substantial stocks on yards. Based on recent sales of basic iron, this grade is quotable at \$17 to \$17.25 a ton, delivered.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	\$17.76 to \$18.26
East. Pa. No. 2X, 2.25 to 2.75 sil.	18.26 to 18.76
East. Pa. No. 1X.	18.76 to 19.26
Basic (del'd east. Pa.)	17.00 to 17.25
Malleable	19.00 to 20.00
Stand. low phos. (f.o.b. east. Pa. furnace)	23.00 to 24.00
Cop. b'r'g low phos. (f.o.b. furnace)	22.00 to 23.00
Va. No. 2 plain, 1.75 to 2.25 sil.	22.29
Va. No. 2X, 2.25 to 2.75 sil.	22.79

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to \$1.64 from eastern Pennsylvania furnaces; \$4.54 from Virginia furnaces.

STEEL BARS

On new business mills are quoting 1.65c. a lb., Pittsburgh, or 1.94c., Philadelphia, but buyers are in certain instances still protected at the first quarter price of 1.60c., Pittsburgh, or 1.89c., Philadelphia, and where a substantial tonnage is offered the current price is sometimes shaded \$1 a ton. Billet steel reinforcing bars are quoted at 1.65c., Pittsburgh, or 1.94c., Philadelphia, but this price is shaded \$1 and \$2 a ton on desirable contracts requiring upward of 100 tons. Rail steel bars are about 1.35c., Pittsburgh, or 1.64c., Philadelphia, subject to oc-

casional concessions on substantial tonnages.

PLATES

A tonnage of specially treated battleship plates is about to be awarded by the Navy Department for battleship reconditioning at the Philadelphia and Norfolk Navy Yards, and a small tonnage of plates will be required by the local locomotive builder for building 20 18,000-gal. tenders for the Union Pacific Railroad. Plates are quoted by eastern Pennsylvania mills at 1.75c., Coatesville, or 1.85½c., Philadelphia, with less than carload lots bringing up to 1.80c., Coatesville, or 1.90½c., Philadelphia. In a number of cases plate users are protected for specific contracts at the first quarter price of 1.70c., Coatesville, or 1.80½c., Philadelphia.

SHAPES

While fabricators are booking a fair number of contracts for bridges and other railroad and public construction, there is little activity in other classes of building. A bridge at St. Nicholas, Pa., for the Reading Railroad has been awarded to a leading independent fabricator. Mills continue to quote shapes at 1.75c., f.o.b. nearest mill to consumer, or 1.81c., Philadelphia, and 1.80c., mill, or 1.86c., Philadelphia, on small lots and miscellaneous specifications. Certain users are protected for specific contracts at the former level of 1.70c., mill, or 1.76c., Philadelphia.

SHEETS

Mills are generally quoting black sheets at 2.25c., Pittsburgh, or 2.54c., Philadelphia, and galvanized at 2.85c., Pittsburgh, or 3.14c., Philadelphia. On desirable business these quotations are occasionally shaded \$1 and \$2 a ton. Blue annealed sheets, No. 13 gage, are 2c. to 2.05c., Pittsburgh, or 2.29c. to 2.34c., Philadelphia, and blue annealed

plates, No. 10 gage, are 1.85c. to 1.90c., Pittsburgh, or 2.14c. to 2.19c., Philadelphia. Special grades of sheets, such as automobile body stock and vitreous enameling sheets, show a price trend toward the lower quotation in the present range.

OLD MATERIAL

Machine shop turnings are off slightly, quotations ranging from \$6.50 to \$7 a ton, delivered eastern Pennsylvania, and No. 2 heavy melting steel and yard grade show a similar decline, the current range, based on offers by dealers, being \$8 to \$8.50 for No. 2 and \$7.50 to \$8 for yard steel. Other grades are generally unchanged in a quiet market.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel	\$10.00 to \$10.50
No. 2 heavy melting steel	8.00 to 8.50
Heavy melting steel (yard)	7.50 to 8.00
No. 1 railroad wrought	11.00 to 11.50
Bundled sheets (for steel works)	9.00
Hydraulic compressed, new	9.00 to 9.50
Hydraulic compressed, old	7.50 to 8.00
Machine shop turnings (for steel works)	6.50 to 7.00
Heavy axle turnings (or equiv.)	9.50 to 10.00
Cast borings (for steel works and roll. mill)	7.50
Heavy breakable cast (for steel works)	11.00 to 11.50
Railroad grate bars	9.00
Stove plate (for steel works)	9.00
No. 1 low phos., hvy. (0.04% and under)	15.50 to 16.00
Couplers and knuckles	14.00 to 15.00
Rolled steel wheels	14.00 to 15.00
No. 1 blast f'nace scrap	6.00
Wrot. iron and soft steel pipes and tubes (new specific)	11.50 to 12.00
Shafting	18.00
Steel axles	17.50 to 18.00
No. 1 forge fire	10.00
Cast iron carwheels	12.50 to 13.00
No. 1 cast	12.00 to 12.50
Cast borings (for chem. plant)	14.00 to 14.50
Steel rolls for rolling	12.50 to 13.00

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Scrap Prices Lower in Detroit

DETROIT, April 21.—Scrap prices again have given ground, and in some instances are down 25c. to 50c. a ton. Scrap buyers are not interested in ordering, consequently the market is virtually at a standstill. No improvement is looked for in the immediate future.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov. steel	\$8.50 to \$9.00
Borings and short turnings	3.75 to 4.25
Long turnings	3.00 to 3.50
No. 1 machinery cast	9.00 to 9.50
Automotive cast	11.25 to 11.75
Hydraul. comp. sheets	8.00 to 8.50
Stove plate	6.50 to 6.75
New No. 1 busheling	6.75 to 7.25
Old No. 2 busheling	2.50 to 3.00
Sheet clippings	5.25 to 5.50
Flashings	7.25 to 7.75

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier	2.50c.
Structural shapes	2.50c.
Soft steel bars, small shapes, iron bars (except bands)	2.60c.
Reinforc. steel bars, sq., twisted and deform.	2.50c. to 2.60c.
Cold-fin. steel, rounds and hex.	3.40c.
Cold-fin. steel, sq. and flats	3.90c.
Steel hoops	3.15c.
Steel bands, No. 12 to ¼-in. inclu.	2.90c.
Spring steel	5.00c.
*Black sheets (No. 24)	3.60c.
†Galvanized sheets (No. 24)	4.15c.
Light plates, blue annealed (No. 10)	3.05c.
Blue ann'd sheets (No. 13)	3.20c.
Diam. pat. floor plates, ¼-in.	5.20c.
Swedish iron bars	6.60c.

*For 50 bundles or more; 10 to 40 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.
†For 50 bundles or more; 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.30c. base.

BOSTON

Textile Company Buys Iron and Cast Iron Pipe Is Active

BOSTON, April 21.—The Draper Corp., Hopedale, Mass., is reported to have purchased between 3000 and 4000 tons of pig iron the past week, but details are withheld. It is said, however, that the business was split among Buffalo district and eastern Pennsylvania furnaces and that the buyer paid more for eastern Pennsylvania iron than for Buffalo iron. With no other business in sight, competition for the Draper tonnage was keen, and Buffalo furnaces heretofore quoting \$16 a ton, base furnace, modified their price all of \$1 a ton. With the Draper Corp. business out of the way, there is nothing in prospect of importance, although it is still said that a Massachusetts melter will be in the market around May 1 for 2000 tons.

Foundry iron prices per gross ton deliv'd to most New England points:

*Buffalo, sil. 1.75 to 2.25	\$19.91 to \$20.91
*Buffalo, sil. 2.25 to 2.75	19.91 to 20.91
*Ala., sil. 1.75 to 2.25	20.11 to 20.61
*Ala., sil. 2.25 to 2.75	20.61 to 21.11
†Ala., sil. 1.75 to 2.25	16.75
†Ala., sil. 2.25 to 2.75	17.25

Freight rates: \$4.91 all rail from Buffalo; \$9.61 all rail from Alabama and \$5.75 rail and water from Alabama to New England seaboard.

*All rail rate.

†Rail and water rate.

CAST IRON PIPE

Sales the past week were slightly larger than the 2500 tons sold the previous week. They included 600 tons of gas pipe for a utility company; 250 tons of 3 to 10 in. for the Watertown, Mass., arsenal; 220 tons for Meriden, Conn.; 250 tons placed privately by a Massachusetts municipality; 150 tons of 6, 10 and 12-in. for Brookline, Mass., and 100 tons of miscellaneous sizes for Cambridge, Mass., taken by the Warren Foundry & Pipe Co.; 100 tons for Methuen, Mass., to

be furnished by the United States Pipe & Foundry Co. Smaller tonnages purchased by Weston, Mass., Wayland, Mass., and other municipalities totaled about 500 tons. Littleton, Mass., has closed bids on 110 tons, but has made no award. Lewiston, Me., has under consideration a substantial pipe purchase. Prices on both pit cast and centrifugal pipe are unsettled. The base price on pit cast pipe is generally \$1 a ton lower at \$33 a ton, on cars foundry, but less was quoted the past week. Differentials on Class A and gas pipe also have no established basis.

FABRICATED STEEL

Prospective business is accumulating, but actual awards of shapes are limited, only one, 800 tons for a local power house, having been made the past week. In a total of 16 jobs considered active, slightly more than 5000 tons of shapes is involved. Plate business has dropped materially the past month, and some shading of prices is noted.

REINFORCING STEEL

Bookings the past week included 700 tons for Vermont road work, 100 tons for a Massachusetts bridge and close to 300 tons in smaller jobs. Despite the quietness of the market, sellers are holding generally to regular list prices. Billet steel bars from stock are 3c. a lb., base, for 1 to 5-ton lots; 2.40c. for 6 to 99-ton lots, and 2.30c. for 100-ton lots and larger. Rail steel bars are 2.26½c. a lb., delivered Boston rate points. About a dozen

jobs, involving a total of 4000 tons, are still hanging over the market.

OLD MATERIAL

Weakness in the Pittsburgh market has not affected New England scrap because there is so little moving out of this territory to the Pittsburgh district. What little is sold is for New England consumption, and even such tonnage has dropped off the past week. No. 1 heavy melting steel and T rails are selling mostly at \$7.10, on cars shipping point, for New England consumption, and long bundled skeleton mostly at \$6.10. There is, however, a demand for breakable cast for consumption outside these States, but supply is short, and one local consumer is taking most of it on a truck delivered price basis. On most of the items quoted below, prices are largely nominal because no shipments have been made in a protracted period.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

*No. 1 heavy melting steel	\$7.00 to \$7.25
*Scrap T rails	7.00 to 7.25
Scrap girder rails	5.50 to 6.00
No. 1 railroad wrought	7.00 to 7.50
Machine shop turnings	2.00 to 2.50
Cast iron borings (steel works and rolling mill)	2.00 to 2.50
*Bundled skeleton, long	6.00 to 6.10
Forge flashings	5.50 to 6.00
Blast furnace borings and turnings	2.00 to 2.50
Forge scrap	5.00 to 5.50
Shafting	13.00 to 13.50
Steel car axles	14.00 to 15.00
Wrought pipe, 1 in. in diameter (over 2 ft. long)	5.60 to 6.10
Rails for rolling	8.50 to 9.00
Cast iron borings, chemical	9.00 to 9.60
No. 2 cast	5.10 to 5.60

Prices per gross ton deliv'd consumers' yards:

Textile cast	\$10.00 to \$10.50
No. 1 machinery cast	10.00 to 10.50
Stove plate	7.00 to 7.25
Railroad malleable	13.00 to 13.50

*For New England consumption.

YOUNGSTOWN

Decline in Steel Orders Believed to Be Checked

YOUNGSTOWN, April 20.—While both open-hearth and finishing mill operations in the Valleys last week reached the lowest point reported since the current decline in specifications began about a month ago, raw steel production will hold its own this week, and a moderate gain in output of finished steel products is in prospect. Several small sheet mills which were inactive last week have resumed production, and gains in strip operations have been reported. While part of this increase is attributed to heavier releases from the automobile industry, the trend of business during the current week will likely reveal the May schedules of the motor car builders.

Steel ingot production seems to have been fairly well adjusted to the lower rate of finishing mill requirements. Somewhat less than 45 per cent of the independent capacity of the district will be active this week, while Steel Corporation plants continue at about 50 per cent, maintain-

ing an aggregate for the district of slightly above 45 per cent. While the recently reduced requirements of sheet, strip and bar mills contributed heavily to recent declines, completion of pipe orders has been a large factor. On the other hand, heavier demand for merchant wire products, reinforcing bars, small shapes and plates, and well maintained tin plate production has helped to offset declines in other lines.

With automobile demand still very uncertain, Valley steel mills look to the line pipe business for their most significant tonnage in the next few weeks. A number of large projects which have been mentioned from time to time since the first of the year are again considered active, and with weather conditions favorable for line pipe installation, there is every reason to believe that such business as will be placed cannot long be deferred. On the other hand, producers point out that the line pipe buying movement last year did not get under

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	3.36½c.
Structural shapes—	
Angles and beams	3.36½c.
Tees	3.36½c.
Zees	3.36½c.
Soft steel bars, small shapes	3.26½c.
Reinforcing bars	3.11½c. to 3.26½c.
Iron bars—	
Refined	3.26½c.
Best refined	4.60c.
Norway rounds	6.60c.
Norway squares and flats	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tire steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex.	3.50c. to 5.50c.
Squares and flats	4.00c. to 6.00c.
Toe calk steel	6.00c.
Rivets, structural or boiler	4.80c.
	Per Cent Off List
Machine bolts	60 and 5
Carriage bolts	60 and 5
Lag screws	60 and 5
Hot-pressed nuts	60 and 5
Cold-punched nuts	60 and 5
Stove bolts	70 and 10

way until early summer, but was of considerable proportions when it did begin. Local users of steel, including fabricators of building products, steel tanks and kindred items, have increased their requirements considerably since the first of the month. This business reflects the beginning of outdoor activity, and, as local consumption is a large factor in maintaining mill operations in the Valleys, such business is counted on to stabilize steel operations at current levels. In other words, not much further curtailment in general demand is looked for, and there is reason to believe that May will bring a small upturn. On the other hand, it is rather difficult to see where demand might come from in the next few weeks which would bring production to the peak rate reached during March.

Finished steel prices in the Valleys are largely nominal, with some shading of current levels reported when desirable tonnage is in prospect. On locally consumed products, quotations are well maintained, and Valley mills believe that concessions in competitive territories, like Detroit, can hardly be considered the market. Sheet and strip prices are weak, and in some cases spot tonnage is being taken below the contract levels which prevailed at the beginning of the quarter. If specifications against contracts were in sufficient volume, this condition probably would not exist, but the necessity of taking tonnage to round out operating schedules cannot be eliminated in spite of the low price levels. Bars and plates are currently quoted at 1.65c. to 1.70c., with the higher price holding on a little current tonnage. Nails and wire are somewhat better maintained at mill asking prices. Semi-finished steel continues at \$30, Youngstown, for billets, slabs and sheet bars, but one or two transactions are said to have been made at lower figures.

Scrap prices are considerably lower, with heavy melting steel available at less than \$12, and hydraulic compressed sheets quotable at not more than \$11.25. While no sales have been made to test the market, dealers are anxious to get orders and price does not seem to be a deciding factor. Pig iron is very dull, with sellers quoting all the principal grades at \$17. Valley furnace.

Warehouse Prices, f.o.b. Buffalo

	Base per lb.
Plates and struc. shapes.....	3.25c.
Soft steel bars.....	3.15c.
Reinforcing bars.....	2.95c.
Cold-fin. flats and sq.....	3.65c.
Rounds and hex.....	3.15c.
Cold-rolled strip steel.....	5.85c.
Black sheets (No. 24).....	4.20c.
Galv. sheets (No. 24).....	4.60c.
Bands.....	3.50c.
Hoops.....	3.90c.
Blue ann'd sheets (No. 10).....	3.50c.
Com. wire nails, base per keg.....	\$2.60
Black wire, base per 100 lb.....	3.20

BUFFALO

Steel Operations Gain Slightly— Scrap Prices Again Decline

BUFFALO, April 20.—Sales of pig iron in the past week were about 3500 tons. The only sizable inquiry is for 2000 to 3000 tons of No. 2X and No. 1X foundry for delivery over the remainder of the year to an Eastern melter. Most of this iron is expected to go to Alabama furnaces. Some of the Buffalo furnaces are quoting \$15 on Eastern business, while others are adhering to the schedule of \$16, base. District prices are unchanged.

Prices per gross ton, f.o.b. furnace:	
No. 2 fdy., sil. 1.75 to 2.25.....	\$17.50
No. 2X fdy., sil. 2.25 to 2.75.....	18.00
No. 1 fdy., sil. 2.75 to 3.25.....	19.00
Malleable, sil. up to 2.25.....	18.00
Basic.....	17.50
Lake Superior charcoal.....	27.28

FINISHED STEEL

A slight increase in mill operation has occurred at the Lackawanna plant of the Bethlehem Steel Co., which is operating 14 open-hearths, having advanced from 12 to 15 the latter part of last week and reduced to 14 this week. Republic Steel Corp. continues to operate three. Wickwire Spencer still has two in service and Gould Coupler one on part time. Most of the structural fabricators report a fair volume of small business. Erie County placed an order for 100 tons of structural steel for a bridge with a local fabricator for Eden, N. Y. The city of Buffalo will shortly advertise for bids for 1200 tons of structural for a bridge on Michigan Avenue. Reinforcing bar business is quiet, although one job in Rochester for the Colgate Divinity School, amounting to 100 tons, was awarded.

OLD MATERIAL

Prices on many grades of scrap have softened considerably in the past week with the announcement by the leading consumer that it will pay no more than \$10.50 for No. 1 heavy melting steel and \$9 for No. 2 heavy melting steel. This contrasts with prices of \$11 and \$9.50 respectively which this user has been paying dealers and with the \$11.40 price it paid on recent railroad lists. This user reports its stock piles six times as large

as at this time last year. Part of the increase is due to decreased operation of open-hearths and the fact that navigation opened later last year than this year. Shipments of drop forge flashings and similar material are being received from Detroit, and, with the softening of outside markets, this principal consumer has decided to lower its price. Shipments are being received via barge canal from New York on a sizable purchase of No. 1 and No. 2 heavy melting steel made in New York some time ago. It is understood that 5000 tons is now in transit. The stove plate market has weakened as the two principal consumers are out of the market. These concerns have been offered stove plate at \$8.75. The market for borings and turnings is very great, with the Niagara Frontier consuming plants closed down.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel.....	\$10.50
No. 2 heavy melting scrap.....	9.00
Scrap rails.....	11.00
Hydraul. comp. sheets.....	9.00
Hand bundled sheets.....	\$8.00 to 8.50
Drop forge flashings.....	9.00
No. 1 busheling.....	9.00
Hvy. steel axle turnings.....	10.50 to 11.00
Machine shop turnings.....	5.00 to 5.50
No. 1 railroad wrought.....	9.00 to 9.50

Acid Open-Hearth Grades:	
Knuckles and couplers.....	12.50 to 13.00
Coil and leaf springs.....	12.50 to 13.00
Rolled steel wheels.....	12.50 to 13.00
Low phos. billet and bloom ends.....	14.00 to 14.50

Electric Furnace Grades:	
Short shov. steel turnings.....	8.00 to 8.50

Blast Furnace Grades:	
Short mixed borings and turnings.....	6.00 to 6.50
Cast iron borings.....	6.00 to 6.50
No. 2 busheling.....	6.00

Rolling Mill Grades:	
Steel car axles.....	15.00 to 15.50
Iron axles.....	16.00 to 16.50

Cupola Grades:	
No. 1 machinery cast.....	10.50
Stove plate.....	8.75 to 9.00
Locomotive grate bars.....	8.00 to 8.25
Steel rails, 3 ft. and under.....	13.50 to 14.00
Cast iron carwheels.....	12.50 to 13.00

Malleable Grades:	
Industrial.....	11.00 to 12.00
Railroad.....	11.00 to 12.00
Agricultural.....	11.00 to 12.00

Special Grades:	
Chemical borings.....	9.50 to 10.00

BIRMINGHAM

Slight Decline in Steel Operations— Pig Iron Demand Dull

BIRMINGHAM, April 21.—Pig iron demand is unimproved. New tonnage remains largely on a spot basis and mostly in small lots. Quotations are unchanged at \$12 to \$13. Shipments last week were noticeably off, and these are now running behind current production for the first time in quite a while. Thirteen furnaces are in blast, no changes having been made in the past 10 days.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.	\$12.00 to \$13.00
No. 1 fdy., 2.25 to 2.75 sil.	12.50 to 13.50
Basic.....	12.00 to 13.00

CAST IRON PIPE

Bookings of the week were routine business in varied lots. Shipments have increased but little, and plant operations are unchanged. Quotations remain on a \$35 to \$36 base.

FINISHED STEEL

While not very active, the market is holding to the level of the past few months. New tonnage so far this month compares favorably with that of similar periods in the recent past. Business is fairly well divided among the various products, but none is showing any particular activity. The weak demand for bars and structural shapes in general construction is offset somewhat by bridge and highway requirements. Active open-hearths now number 15, the Tennessee company operating 12 instead of 13, and the Gulf States Steel continuing with three.

COKE

No material change has occurred in the foundry coke market, which is reflecting the sluggishness of pig iron. Quotations are unchanged at \$5.

OLD MATERIAL

The purchase of a large tonnage of heavy melting steel, estimated at around 10,000 tons, by one of the steel companies and some other scattered business produced a very satisfactory feeling in the market last week. Prices are unchanged.

Prices per gross ton deliv'd Birmingham dist, consumers' yards:

Heavy melting steel.....	\$9.50 to \$10.00
Scrap steel rails.....	10.00
Short shoveling turnings..	7.50
Cast iron borings.....	(No market)
Stove plate.....	7.50
Steel axles.....	15.00 to 16.00
Iron axles.....	18.00
No. 1 railroad wrought....	8.00
Rails for rolling.....	11.50 to 12.00
No. 1 cast.....	10.00
Tramcar wheels.....	11.00 to 11.25
Cast iron borings, chem....	13.50
Cast iron carwheels.....	11.00

Traylor Engineering & Mfg. Co., Allentown, Pa., will remove its New York office on May 1 from 30 Church Street to the Empire State Building. R. R. Shafter is in charge.

Warehouse Prices, f.o.b. St. Louis

Base per Lb.	
Plates and struc. shapes.....	3.25c
Bars, soft steel or iron.....	3.15c
Cold-fin. rounds, shaftings, screw stock.....	3.60c
Black sheets (No. 24).....	4.05c
Galv. sheets (No. 24).....	4.60c
Blue ann'd sheets (No. 10).....	3.45c
Black corrug. sheets (No. 24).....	4.10c
Galv. corrug. sheets.....	4.65c
Structural rivets.....	4.15c
Boiler rivets.....	4.15c

Per Cent Off List	
Tank rivets, $\frac{3}{8}$ -in. and smaller, 100 lb. or more.....	65
Less than 100 lb.....	60
Machine bolts.....	60 and 10
Carriage bolts.....	60 and 10
Lag screws.....	60 and 10
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more.....	60 and 10
Less than 200 lb.....	50 and 10
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more.....	60 and 10
Less than 200 lb.....	50 and 10

ST. LOUIS Pig Iron Buying on Small Scale—Scrap Prices Lower

ST. LOUIS, April 21.—Buying of pig iron during the last few weeks is said to have been on the smallest scale ever experienced here. Melters in the district say that their order files do not warrant their placing any tonnages at present. Steel mills and stove foundries in the district are said to be operating at further reduced schedules. The price situation is unchanged, but how firm present quotations are cannot be determined until there is some real test.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.....	\$17.50
Malleable, f.o.b. Granite City.....	17.50
N'th'n No. 2 fdy., deliv'd St. Louis..	19.66
Southern No. 2 fdy., deliv'd.....	15.42
Northern malleable, deliv'd.....	19.66
Northern basic, deliv'd.....	19.66

Freight rates: 75c. (average) Granite City to St. Louis; \$2.16 from Chicago; \$4.42 from Birmingham.

FINISHED MATERIAL

Fabricators of structural steel in the district are said to be operating at about 30 per cent of capacity. No heavy tonnage is in sight here. Local fabricators will bid on the Kansas City, Mo., Post Office, requiring 4500 tons of structurals. The only reinforcing bar award of the week, 325 tons for a City Hospital nurses' home, went to the Missouri Rolling Mills Corp'n. Bids will be opened April 28 on two municipal water storage reservoir covers, requiring 1000 tons of reinforcing bars.

OLD MATERIAL

There was no buying of scrap during the week by the mills in the district, and there seems to be no prospect of their buying soon. Railroads still are offering scrap freely, but no shipments are coming in from other factors on account of the low prices prevailing. Selected heavy melting steel and miscellaneous standard-section rails are 25c. a ton lower. A 50c. decline is reported for railroad springs, heavy turnings, No. 1 railroad wrought, steel rails less than 1 ft., cast iron carwheels, No. 1 machinery cast, railroad malleable and agricultural malleable.

Railroad lists: International Great Northern, 800 tons and 4 carloads; Missouri-Kansas-Texas, 3000 tons; Chicago, Burlington & Quincy, 3940 tons; Chicago & Alton, 910 tons; Chicago Great Western, 132 carloads; Chicago Belt Railway, 28 carloads; Chicago & Eastern Illinois, 25 carloads; St. Louis-San Francisco, 20 carloads.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

Selected heavy melting steel.....	\$8.50 to \$9.00
No. 1 heavy melting or shoveling steel.....	8.25 to 8.75
No. 2 heavy melting or shoveling steel.....	7.75 to 8.25
No. 1 locomotive tires....	10.00 to 10.50
Misc. stand.-sec. rails including frogs, switches and guards, cut apart....	9.00 to 9.50

Railroad springs.....	10.50 to 11.00
Bundled sheets.....	6.00 to 6.50
No. 2 railroad wrought....	8.25 to 8.50
No. 1 busheling.....	6.00 to 6.50
Cast iron borings and shoveling turnings.....	5.50 to 6.00
Iron rails.....	8.00 to 8.50
Rails for rolling.....	10.25 to 11.00
Machine shop turnings....	3.00 to 3.50
Heavy turnings.....	6.50 to 7.00
Steel car axles.....	12.50 to 13.00
Iron car axles.....	17.50 to 18.00
Wrot. iron bars and trans.	9.00 to 9.50
No. 1 railroad wrought....	6.50 to 7.00
Steel rails, less than 3 ft..	11.50 to 12.00
Steel angle bars.....	9.00 to 9.50
Cast iron carwheels.....	8.00 to 8.50
No. 1 machinery cast....	8.50 to 9.00
Railroad malleable.....	9.50 to 10.00
No. 1 railroad cast.....	8.50 to 9.00
Stove plate.....	7.00 to 7.50
Relay. rails, 60 lb. and under.....	16.00 to 16.50
Relay. rails, 70 lb. and over.....	20.00 to 21.00
Agricult. malleable.....	8.50 to 9.00

Canada

Structural Steel Outlook Fairly Promising

TORONTO, April 21.—Merchant pig iron sales for the past week were well up to the high average for the year, but new business was generally in small lots for spot delivery. Future delivery buying has come to a standstill, but regular shipments are being made against old contracts, and deliveries are said to run to good volume. New business is largely from manufacturers who share in railway contracts. No revision has been made in price lists since the beginning of the year.

Prices per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75.....	\$22.60
No. 2 fdy., sil. 1.75 to 2.25.....	22.10
Malleable.....	22.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75.....	\$24.00
No. 2 fdy., sil. 1.75 to 2.25.....	23.50
Malleable.....	24.00
Basic.....	20.50

STRUCTURAL STEEL

Building trades are gradually getting under way and at the same time are creating a better demand for building steel. Most of the projects recently announced, however, involve the use of small tonnages of steel, although several companies have announced programs for which as much as 5000 to 7000 tons will be required. In the latter group is the Bank of Nova Scotia, which will erect a 21-story building at King and Bay Streets, Toronto, and is now clearing the site. Bridge work has been a leading factor in stimulating demand for structural shapes for some time past, and, according to announcements by railways, municipal and provincial governments, several large undertakings are planned. The Department of Public Works, Quebec,

will call for bids soon on about 5000 tons of steel for a bridge over the Saguenay River.

OLD MATERIAL

The iron and steel scrap market is listless. New business is slow and generally confined to special grades. Steel scrap has limited call. Dealers are still out of the market for most lines of scrap and as a consequence have not yet revised buying price lists.

Dealers' buying prices for old material:
Per Gross Ton

	Toronto	Montreal
Heavy melting steel.....	\$7.00	\$6.00
Rails, scrap.....	7.00	6.00
No. 1 wrought.....	6.00	8.00
Machine shop turnings....	2.00	2.00
Boiler plate.....	5.00	4.50
Heavy axle turnings.....	2.50	2.50
Cast borings.....	2.00	2.00
Steel borings.....	2.00	2.00
Wrought pipe.....	2.00	2.00
Steel axles.....	7.00	9.00
Axles, wrought iron.....	7.00	11.00
No. 1 machinery cast.....	10.00	10.00
Stove plate.....	8.00	8.00
Standard carwheels.....	8.50	8.50
Malleable.....	8.00	8.00
Per Net Ton		
No. 1 mach'ry cast.....	11.00	....
Stove plate.....	9.00	....
Standard carwheels.....	10.00	....
Malleable scrap.....	9.00	....

Pacific Coast

Bridge to Take 110,000 Tons of Steel, Pipe Line 30,000 Tons

SAN FRANCISCO, April 18.—(By Air Mail)—Demand for steel products on the Pacific Coast remains quiet, while prices are far from firm. General building operations have shown no signs of improvement, but a fair volume of State and county work is being released.

Bids will be called for in about 10 days for the construction of the Golden Gate bridge over San Francisco Bay. This bridge will require 110,000 tons of structural steel and cables and will be the largest project ever to come up for figures on the Pacific Coast. In addition, bids will be called for shortly for 30,000 tons of plates for the Hetch Hetchy pipe line, San Francisco.

BARS

Awards of reinforcing steel bars exceeded 1200 tons and included 350 tons for a garage in Seattle and 200 tons for a bridge in Tacoma, both placed with unnamed interests. The

Pig iron prices per gross ton at San Francisco:

*Utah basic.....	\$22.00 to \$24.00
*Utah fdy., sil. 2.75 to 3.25.....	22.00 to 24.00
**Indian fdy., sil. 2.75 to 3.25.....	22.00 to 24.00

*Delivered San Francisco.

**Duty paid, f.o.b. cars San Francisco.

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and struc. shapes.....	2.50c.
Soft steel bars.....	2.50c.
Black sheets (No. 24).....	4.15c.
Blue ann'd sheets (No. 10).....	3.05c.
Galv. sheets (No. 24).....	4.65c.
Struc. rivets, 1/2-in. and larger.....	5.00c.
Com. wire nails, base per keg.....	\$3.35
Cement c'd nails, 100 lb. keg.....	3.35

Northwest Steel Rolling Mills booked 250 tons for an addition to the American Can Co. plant, Seattle, and 100 tons for highway work for the State of Washington. The Mercer Steel Co. took 100 tons for a hospital in Astoria, Ore. Bids were opened on 138 tons for paving in Los Angeles County, Cal. The bulk of the new inquiries involved lots ranging from 50 to 70 tons. San Francisco prices on out-of-stock material remain unchanged at 2.60c., base, on carload lots. Los Angeles quotations continue at 2.50c., base.

SHAPES

Little, if any improvement, in demand for structural steel is noted. Awards were all in lots of less than 100 tons. Among the new inquiries are 650 tons for a hospital addition in Los Angeles and 113 tons for a bridge over the Trinity River in California. It is thought that local fabricators will not submit bids on 110,000 tons for the Golden Gate bridge due to the fact that no fabricating

plant on the Coast has capacity to handle the job. Several Eastern concerns are planning to submit bids. Shapes continue to range from 2.05c. to 2.15c., c.i.f.

CAST IRON PIPE

The only letting of importance involved 2725 tons of 16 to 24-in. Class B pipe for Los Angeles and was placed with the Utilities Equipment Corp., representing R. D. Wood & Co. Bids were opened on 1600 tons of 28-in. pipe for Aberdeen, Wash., and on 2896 tons of 6 and 12-in. Class 150 pipe for Los Angeles. Bids will be opened on May 4 for 100 tons of 6-in. Class C pipe for San Diego.

SHEETS

Activity in this market is far from pronounced, the bulk of sales and inquiries calling for small lots. No. 24 gage galvanized sheets are quoted at 3.50c., base, c.i.f.; No. 24 gage black sheets hold at 3c., and No. 10 blue annealed sheets are quoted at 2.50c., base, c.i.f.

PLATES

The bulk of current sales and inquiries were limited to unimportant lots. Bids were opened this week on 1000 tons for a pipe line in Aberdeen, Wash., alternate bids being received for cast iron, wood and concrete pipe. Prices range from 2.00c. to 2.05c., c.i.f.

CINCINNATI

Pig Iron and Steel Orders Reflect Business Uncertainty

CINCINNATI, April 21.—Demand for pig iron continues to reflect the slowness of general business. The attitude of buyers is governed by their own sales, and they are taking iron on a hand-to-mouth basis. Total sales last week receded somewhat from recent levels. Furnace representatives booked about 1700 tons. Inquiry is infrequent and small. The only sizable order last week was for 300 tons of Northern foundry.

Prices per gross ton, deliv'd Cincinnati:	
Ala. fdy., sil. 1.75 to 2.25..	\$14.19 to \$14.69
Ala. fdy., sil. 2.25 to 2.75..	14.69 to 15.19
Tenn. fdy., sil. 1.75 to 2.25..	14.19 to 14.69
S'th'n Ohio silvery, 8 per cent.....	24.39

Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$3.69 from Birmingham.

OLD MATERIAL

With shipments being held up by district mills in certain instances and users generally being reluctant to purchase in substantial quantities, the district scrap market is quiet. With no test of prices, dealers continue to maintain the recent schedule.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel.....	\$8.75 to \$9.25
Scrap rails for melting.....	10.50 to 11.00
Loose sheet clippings.....	4.75 to 5.25
Bundled sheets.....	8.25 to 8.75
Cast iron borings.....	4.75 to 5.25

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.15c.
New billet reforc. bars.....	3.15c.
Rail steel reforc. bars.....	3.00c.
Hoops.....	3.90c.
Bands.....	3.35c.
Cold-fin. rounds and hex.....	3.80c.
Squares.....	4.30c.
Black sheets (No. 24).....	3.90c.
Galvanized sheets (No. 24).....	4.40c.
Blue ann'd sheets (No. 10).....	3.45c.
Structural rivets.....	4.20c.
Small rivets.....	.60 per cent off list
No. 9 ann'd wire, per 100 lb.....	\$3.00
Com. wire nails, base per keg (25 kegs or more).....	2.95
Cement c'd nails, base 100 lb. keg.....	2.95
Chain, per 100 lb.....	10.25
Net per 100 Ft.	
Lap-welded steel boiler tubes, 2-in.....	\$16.50
4-in.....	34.50
Seamless steel boiler tubes, 2-in.....	17.50
4-in.....	36.00

Machine shop turnings.....	5.00 to 5.50
No. 1 busheling.....	7.25 to 7.75
No. 2 busheling.....	4.25 to 4.75
Rails for rolling.....	11.50 to 12.00
No. 1 locomotive tires.....	10.00 to 10.50
No. 2 railroad wrought.....	8.75 to 9.25
Short rails.....	13.75 to 14.25
Cast iron carwheels.....	10.50 to 11.00
No. 1 machinery cast.....	13.00 to 13.50
No. 1 railroad cast.....	11.50 to 12.00
Burnt cast.....	6.50 to 7.00
Stove plate.....	6.50 to 7.00
Brake shoes.....	6.50 to 7.00
Agricultural malleable.....	11.00 to 11.50
Railroad malleable.....	12.00 to 12.50

Billets and Blooms	
	Per Gross Ton
Rerolling, 4-in. and under 10-in., Pittsburgh	\$30.00
Rerolling, 4-in. and under 10-in., Youngstown	30.00
Rerolling, 4-in. and under 10-in., Cleveland	30.00
Rerolling, 4-in. and under 10-in., Chicago	31.00 to 32.00
Forging quality, Pittsburgh	36.00

Sheet Bars	
(Open-Hearth or Bessemer)	Per Gross Ton
Pittsburgh	\$30.00
Youngstown	30.00
Cleveland	30.00
Slabs	
(8 in. x 2 in. and under 10 in. x 10 in.)	Per Gross Ton
Pittsburgh	\$30.00
Youngstown	30.00
Cleveland	30.00

Skelp	
(F.o.b. Pittsburgh or Youngstown)	Per Lb.
Grooved	1.65c
Universal	1.65c
Sheared	1.65c
Wire Rods	
(Common soft, base)	Per Gross Ton
Pittsburgh	\$35.00 to \$37.00
Cleveland	35.00 to 37.00
Chicago	35.00 to 37.00

Ores	
Lake Superior Ores, Delivered Lower Lake Ports	Per Gross Ton
Old range Bessemer, 51.50% iron	\$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore	
Per Unit	
Iron ore low phos., copper free, 55 to 58% iron in dry Spanish or Algeria	.8c. to 9c.
Iron ore, low phos., Swedish, average 68% iron	10.00c.
Iron ore, basic or foundry, Swedish, average 65% iron	9.00c.
Manganese ore, washed 52% manganese, from the Caucasus	25c. to 27c.
Manganese ore, African or Indian, 50 to 52%	24c. to 26c.
Manganese ore, Brazilian, 46 to 48%	22c. to 24c.
Tungsten ore, high grade, per unit, in 60% concentrates	\$12.00 to \$12.50
Per Gross Ton	
Chrome ore, 45% Cr ₂ O ₃ crude, c.i.f. Atlantic seaboard	\$20.00
Chrome ore, 48% Cr ₂ O ₃ crude, c.i.f. Atlantic seaboard	22.50

Coke	
	Per Net Ton
Furnace, f.o.b. Connellsville prompt	\$2.50
Foundry, f.o.b. Connellsville prompt	\$3.25 to 4.75
Foundry, by-products, Chgo ovens	8.00
Foundry, by-products, New England, del'd	11.00
Foundry, by-product, Newark or Jersey City, delivered	9.00 to 9.40
Foundry, by-product, Phila.	9.00
Foundry, Birmingham	5.00
Foundry, by-products, St. Louis, f.o.b. ovens	8.00
Foundry, by-prod., del'd St. Louis	9.00

Coal	
	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	\$1.35 to \$1.50
Mine run coking coal, f.o.b. W. Pa. mines	1.40 to 1.50
Gas coal, 3/4-in., f.o.b. Pa. mines	1.70 to 1.80
Mine run gas coal, f.o.b. Pa. mines	1.50 to 1.60
Steam slack, f.o.b. W. Pa. mines	.65 to .75
Gas slack, f.o.b. W. Pa. mines	1.00 to 1.15

Ferromanganese	
	Per Gross Ton
Domestic 80% seaboard	*\$80.00 to \$85.00
Foreign, 80% Atlantic or Gulf port, duty paid	*\$80.00 to 85.00
*Minimum price quoted for lots of 2000 tons or more.	

Spiegeleisen	
	Per Gross Ton Furnace
Domestic, 19 to 21%	\$28.00 to \$30.00
Electric Ferrosilicon	
	Per Gross Ton Delivered
50%	\$83.50
75%	130.00
Per Gross Ton Furnace	
10%	\$35.00
11%	37.00
12%	14 to 16%
13%	\$39.00
14%	39.00
Bessemer Ferrosilicon	
F.o.b. Jackson County, Ohio, Furnace	Per Gross Ton
10%	\$25.00
11%	26.00
12%	27.00
13%	13%
14%	\$29.00
15%	31.00
16%	33.00

Silvery Iron	
F.o.b. Jackson County, Ohio, Furnace	Per Gross Ton
6%	\$21.00
7%	21.50
8%	22.00
9%	22.50
10%	23.00
11%	23.50
12%	24.00
13%	24.50
14%	25.00
15%	25.50
16%	26.00
17%	26.50
18%	27.00
19%	27.50
20%	28.00
21%	28.50
22%	29.00
23%	29.50
24%	30.00
25%	30.50
26%	31.00
27%	31.50
28%	32.00
29%	32.50
30%	33.00
31%	33.50
32%	34.00
33%	34.50
34%	35.00
35%	35.50
36%	36.00
37%	36.50
38%	37.00
39%	37.50
40%	38.00
41%	38.50
42%	39.00
43%	39.50
44%	40.00
45%	40.50
46%	41.00
47%	41.50
48%	42.00
49%	42.50
50%	43.00
51%	43.50
52%	44.00
53%	44.50
54%	45.00
55%	45.50
56%	46.00
57%	46.50
58%	47.00
59%	47.50
60%	48.00
61%	48.50
62%	49.00
63%	49.50
64%	50.00
65%	50.50
66%	51.00
67%	51.50
68%	52.00
69%	52.50
70%	53.00
71%	53.50
72%	54.00
73%	54.50
74%	55.00
75%	55.50
76%	56.00
77%	56.50
78%	57.00
79%	57.50
80%	58.00
81%	58.50
82%	59.00
83%	59.50
84%	60.00
85%	60.50
86%	61.00
87%	61.50
88%	62.00
89%	62.50
90%	63.00
91%	63.50
92%	64.00
93%	64.50
94%	65.00
95%	65.50
96%	66.00
97%	66.50
98%	67.00
99%	67.50
100%	68.00

Other Ferroalloys	
	Per Gross Ton
Ferrotungsten, per lb. contained metal	\$1.08
del'd, carloads	\$1.15 to 1.25
Ferrotungsten, less carloads	\$1.15 to 1.25
Ferrocromium 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	11.00c.
Ferrocromium, 2% carbon	17.00c. to 17.50c.
Ferrocromium, 1% carbon	19.00c. to 20.00c.
Ferrocromium, 0.10% carbon	24.50c. to 26.00c.
Ferrocromium, 0.06% carbon	26.50c. to 28.00c.
Ferrovandium, per lb. contained vanadium, f.o.b. furnace	\$3.15 to \$3.65
Ferrocobaltititanium 15 to 18%, per net ton, f.o.b. furnace, in carloads	\$160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base per gross ton	91.00
Ferrophosphorus, electric, 24%, f.o.b. Anniston, Ala., per gross ton	122.50
Silico-manganese, gross ton, delivered	135.00

Fluxes and Refractories	
Fluorspar	
	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silicon, gravel, f.o.b. Illinois and Kentucky mines	\$14.00 to 14.50
No. 2 lump, Illinois and Kentucky mines	17.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	17.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2 1/2% silicon, f.o.b. Illinois and Kentucky mines	32.50

Fire Clay Brick	
	Per 1000 f.o.b. Works
High-Heat	Intermediate
Duty Brick	Heavy Duty Brick
Pennsylvania	\$40.00 to \$43.00
Maryland	40.00 to 43.00
New Jersey	40.00 to 43.00
Ohio	40.00 to 43.00
Kentucky	40.00 to 43.00
Missouri	40.00 to 43.00
Illinois	40.00 to 43.00
Ground fire clay, per ton	6.50

Silica Brick	
	Per 1000 f.o.b. Works
Pennsylvania	\$45.00
Chicago	49.00
Birmingham	47.00
Silica clay, per ton	8.00

Magnesite Brick	
	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	\$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00

Chrome Brick	
	Per Net Ton
Standard size	\$45.00

Bolts and Nuts	
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)	Per Cent Off List
Machine bolts	.73
Carriage bolts	.73
Lag bolts	.73
Plow bolts, Nos. 1, 2, 3 and 7 heads	.73
Hot-pressed nuts, blank or tapped, square	.73
Hot-pressed nuts, blank or tapped, hexagons	.73
C.p.e. and t. square or hex. nuts, blank or tapped	.73
Washers*	7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.
 *Bolts with rolled thread up to and including 3/4 in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts	
	Per Cent Off List
Semi-finished hexagons nuts	.73
Semi-finished hexagons castellated nuts, S.A.E.	.73
Stove bolts in packages, P'gh	.80, 10, 10 and 5
Stove bolts in packages, Chicago	.80, 10, 10 and 5
Stove bolts in packages, Cleveland	.80, 10, 10 and 5
Stove bolts in bulk, P'gh	.80, 10, 10, 5 and 2 1/2
Stove bolts in bulk, Chicago	.80, 10, 10, 5 and 2 1/2
Stove bolts in bulk, Cleveland	.80, 10, 10, 5 and 2 1/2
Tire bolts	.60, 10 and 10

Discounts of 73 per cent off on bolts and nuts apply on carload business with jobbers and large consumers.

Large Rivets	
(1/2-in. and larger)	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	\$2.75
F.o.b. Chicago	2.85

Small Rivets	
(3/8-in. and smaller)	Per Cent Off List
F.o.b. Pittsburgh	.70, 10 and 5
F.o.b. Cleveland	.70, 10 and 5
F.o.b. Chicago	.70, 10 and 5
Cap and Set Screws	
	Per Cent Off List
(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)	
Milled cap screws	.80, 10, 10 and 5
Milled standard set screws, case hardened	80 and 5
Milled headless set screws, cut thread	.75 and 10
Upset hex. head cap screws, U.S.S.S. thread	85 and 10
Upset hex. cap screws, S.A.E. thread	.85 and 10
Upset set screws	.80, 10 and 5
Milled studs	.70

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.65c. to 1.70c.
F.o.b. Chicago.....	1.75c. to 1.80c.
Del'd Philadelphia.....	1.94c. to 1.99c.
Del'd New York.....	1.98c. to 2.03c.
F.o.b. Cleveland.....	1.65c. to 1.70c.
F.o.b. Lackawanna.....	1.75c. to 1.80c.
F.o.b. Birmingham.....	1.80c.
C.I.F. Pacific ports.....	2.25c.
F.o.b. San Francisco mills.....	2.25c.

Billet Steel Reinforcing

F.o.b. P'gh mills, 40, 50, 60-ft.....	1.65c. to 1.90c.
F.o.b. Birmingham, mill lengths.....	1.75c. to 1.80c.

Rail Steel

F.o.b. mills, east of Chicago dist.....	1.50c. to 1.55c.
F.o.b. Chicago Heights mill.....	1.60c. to 1.65c.
Del'd Philadelphia.....	1.84c. to 1.89c.

Iron

Common iron, f.o.b. Chicago.....	1.75c. to 1.80c.
Refined iron, f.o.b. P'gh mills.....	2.75c.
Common iron del'd Philadelphia.....	2.09c.
Common iron, del'd New York.....	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.65c. to 1.70c.
F.o.b. Chicago.....	1.75c. to 1.80c.
F.o.b. Birmingham.....	1.80c.
Del'd Cleveland.....	1.83 1/2c.
Del'd Philadelphia.....	1.85 1/2c.
F.o.b. Coatesville.....	1.75c. to 1.80c.
F.o.b. Sparrows Point.....	1.75c. to 1.80c.
F.o.b. Lackawanna.....	1.75c. to 1.80c.
Del'd New York.....	1.93c. to 1.98c.
C.I.F. Pacific ports.....	2.05c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.65c. to 1.70c.
F.o.b. Chicago.....	1.75c. to 1.80c.
F.o.b. Birmingham.....	1.80c.
F.o.b. Lackawanna.....	1.75c. to 1.80c.
F.o.b. Bethlehem.....	1.75c. to 1.80c.
Del'd Cleveland.....	1.83 1/2c.
Del'd Philadelphia.....	1.76c.
Del'd New York.....	1.90 1/2c. to 1.95 1/2c.
C.I.F. Pacific ports.....	2.15c. to 2.25c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, P'gh.....	1.60c. to 1.65c.
Wider than 6 in., P'gh.....	1.50c. to 1.55c.
6 in. and narrower, Chicago.....	1.75c. to 1.80c.
Wider than 6 in., Chicago.....	1.65c. to 1.70c.
Cooperage stock, P'gh.....	1.80c. to 1.90c.
Cooperage stock, Chicago.....	1.80c. to 1.90c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill.....	2.10c.
Bars, f.o.b. Chicago.....	2.10c.
Bars, Cleveland.....	2.10c.
Bars, Buffalo.....	2.10c.
Shafting, ground, f.o.b. mill.....	2.45c. to 3.40c.
Strips, P'gh.....	2.25c.
Strips, Cleveland.....	2.25c.
Strips, del'd Chicago.....	2.53c.
Strips, Worcester.....	2.40c. to 2.50c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland.....	3.20c. to 3.30c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland)	
To Manufacturing Trade	
Bright wire.....	2.20c. to 2.30c.
Spring wire.....	3.20c. to 3.30c.

To Jobbing Trade

	Base per Lb.
Smooth annealed wire.....	2.35c. to 2.45c.
Smooth galvanized wire.....	2.80c. to 2.90c.
Polished staples.....	2.35c. to 2.45c.
Galvanized staples.....	2.60c. to 2.70c.
Barbed wire, galvanized.....	2.55c. to 2.65c.
Woven wire fence, per net ton.....	\$60.00

	Base per Keg
Standard wire nails.....	\$1.90 to \$2.00
Smooth coated nails.....	1.90 to 2.00
Galvanized nails.....	3.90 to 4.00

To Retail Trade

	Base per Lb.
Bright wire.....	2.30c. to 2.40c.
Smooth annealed wire.....	2.40c. to 2.50c.
Smooth galvanized wire.....	2.90c. to 3.00c.

	Base per Keg
Standard wire nails.....	\$2.00 to \$2.10
Cement coated nails.....	2.00 to 2.10
Galvanized nails.....	4.00 to 4.10

	Base per Lb.
Polished staples.....	2.45c. to 2.55c.
Galvanized staples.....	2.70c. to 2.80c.
Barbed wire galvanized.....	2.65c. to 2.75c.
Woven wire fence per net ton.....	\$65.00

Anderson, Ind., mill prices are ordinarily \$1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill \$2 a ton over Pittsburgh, and Birmingham mill \$3 a ton over Pittsburgh.

Light Plates

	Base per Lb.
No. 10, blue annealed, f.o.b. P'gh.....	1.85c.
No. 10, blue annealed, f.o.b. Chicago.....	1.95c. to 2.00c.
No. 10, blue an'd, del'd Phila.....	2.14c. to 2.19c.
No. 10, blue annealed, B'ham.....	2.00c. to 2.05c.
No. 10, blue annealed, Pacific Coast ports.....	2.50c.

Sheets

	Base per Lb.
No. 13, f.o.b. P'gh.....	2.00c. to 2.05c.
No. 13, f.o.b. Chicago dist.....	2.10c. to 2.15c.
No. 13, del'd Philadelphia.....	2.29c. to 2.34c.
No. 13, blue annealed, B'ham.....	2.15c. to 2.20c.

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh.....	2.25c.
No. 24, f.o.b. Chicago dist. mill.....	2.35c.
No. 24, del'd Philadelphia.....	2.44c. to 2.54c.
No. 24, f.o.b. Birmingham.....	2.40c. to 2.50c.
No. 24, c.i.f. Pacific Coast ports.....	3.00c.

Steel Furniture Sheets

No. 24, f.o.b. P'gh.....	3.50c.
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Galvanized

No. 24, f.o.b. Pittsburgh.....	2.80c. to 2.90c.
No. 24, f.o.b. Chicago dist. mill.....	2.90c. to 3.00c.
No. 24, del'd Cleveland.....	3.08 1/2c.
No. 24, del'd Philadelphia.....	3.24c.
No. 24, f.o.b. Birmingham.....	2.80c. to 2.90c.
No. 24, c.i.f. Pacific Coast ports.....	3.50c.

Continuous Mill Sheets

No. 10 gage.....	1.70c.
No. 13 gage.....	1.85c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh.....	2.55c. to 2.65c.
No. 28, f.o.b. Chicago dist. mill.....	2.65c. to 2.75c.

Automobile Body Sheets

No. 24, f.o.b. Pittsburgh.....	3.10c.
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Long Terns

No. 24, 8-lb. coating, f.o.b. mill:	
Unassorted.....	3.15c.
Seconds.....	3.25c.
Primes only.....	3.35c.

Vitreous Enameling Stock

No. 24, f.o.b. Pittsburgh.....	3.70c.
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Tin Plate

Standard cokes, f.o.b. P'gh district mills.....	\$5.00
Standard cokes, f.o.b. Gary.....	5.10

Terne Plate

(F.o.b. Morgantown or Pittsburgh)	
(Per Package, 20 x 28 in.)	
8-lb. coating I.C. \$10.30	25-lb. coating I.C. \$15.20
15-lb. coating I.C. 12.90	30-lb. coating I.C. 16.00
20-lb. coating I.C. 14.00	40-lb. coating I.C. 17.80

Alloy Steel Bars

(F.o.b. maker's mill)	
Alloy Quantity Bar Base, 2.65c. per Lb.	

	Alloy
S.A.E. Series	Differential
Numbers	
2000 (1 1/4% Nickel).....	\$0.25
2100 (1 1/2% Nickel).....	0.55
2300 (3 1/2% Nickel).....	1.50
2500 5% Nickel.....	2.25
3100 Nickel Chromium.....	0.55
3200 Nickel Chromium.....	1.35
3300 Nickel Chromium.....	3.50
3400 Nickel Chromium.....	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum).....	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum).....	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel).....	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium).....	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium).....	0.45
5100 Chromium Spring Steel.....	0.20
6100 Chromium Vanadium Bar.....	1.20
6100 Chromium Vanadium Spring Steel.....	0.95
9250 Silicon Manganese Spring Steel (flats).....	0.25
Rounds and squares.....	0.50
Chromium Nickel Vanadium.....	1.50
Carbon Vanadium.....	0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is 3/4c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a sectional area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2 1/2 in. thick, regardless of sectional area, take the bar price.

Rails

	Per Gross Ton
Standard, f.o.b. mill.....	\$43.00
Light (from billets), f.o.b. mill.....	34.00
Light (from rail steel), f.o.b. mill.....	32.00
Light (from billets), f.o.b. Ch'go mill.....	36.00

Track Equipment

	Base per 100 Lb.
Spikes, 3/4 in. and larger.....	\$2.70
Spikes, 1/2 in. and larger.....	2.70

Spikes, boat and barge.....	\$2.90
Tie plate, steel.....	1.95
Angle bars.....	2.75
Track bolts, to steam railroads.....	\$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count.....	73 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Inches	Steel	Black Galv.	Inches	Iron	Black Galv.
1/8	47	21 1/2	3 1/2 and 3 3/4	11	13
1/4	53	27 1/2	4	23	5
3/8	58	44 1/2	5	28	11
1/2	62	50 1/2	6	31	15
3/4	64	52 1/2	7 and 8	35	18

Lap Weld

Inches	Steel	Black Galv.	Inches	Iron	Black Galv.
2	57	45 1/2	2	23	9
2 1/2 to 6	61	49 1/2	2 1/2 to 3 1/2	28	13
7 and 8	58	45 1/2	4 to 6	30	17
9 and 10	56	43 1/2	7 and 8	29	16
11 and 12	55	42 1/2	9 to 12	26	11

Butt Weld, extra strong, plain ends

Inches	Steel	Black Galv.	Inches	Iron	Black Galv.
1/8	43	26 1/2	3 1/2 and 3 3/4	13	18
1/4	49	32 1/2	4	23	7
3/8	55	44 1/2	5	28	12
1/2	60	49 1/2	6	34	18
3/4	62	51 1/2	7 and 8	31	17
1 to 1 1/2	63	52 1/2	9 to 12	26	11

Lap Weld, extra strong, plain ends

Inches	Steel	Black Galv.	Inches	Iron	Black Galv.
2	55	44 1/2	2	29	13
2 1/2 to 4	59	48 1/2	2 1/2 to 4	34	20
4 1/2 to 6	58	47 1/2	4 1/2 to 6	33	19
7 to 8	54	41 1/2	7 and 8	31	17
9 and 10	47	34 1/2	9 to 12	21	8
11 and 12	46	33 1/2			

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5%, and on galvanized by 1 1/2 points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2 1/2%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2 1/2 points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

	Steel	Charcoal Iron
2 in. and 2 1/4 in.....	38	1 1/2 in..... 1
2 1/2 in.—2 3/4 in.....	46	1 3/4 in..... 8
3 in.....	52	2 in.—2 1/4 in..... 13
3 1/4 in.—3 1/2 in.....	54	2 1/2 in.—2 3/4 in..... 16
4 in.....	57	3 in.—3 1/4 in..... 17
4 1/2 in. to 6 in.....	46	3 1/2 in. to 3 3/4 in..... 20
		4 in..... 21
		4 1/2 in..... 21

On lots of a carload or more, the above base discounts are subject to a preferential of two points on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

	Cold Drawn
1 in.....	61
1 1/4 to 1 1/2 in.....	53
1 3/4 in.....	37
2 to 2 1/4 in.....	32
2 1/2 to 2 3/4 in.....	40

Hot Rolled

2 and 2 1/4 in.....	38
2 1/2 and 2 3/4 in.....	46
3 in.....	52
3 1/4 to 3 1/2 in.....	54
4 in.....	57
4 1/2, 5 and 6 in.....	46

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30% base (carloads).....	55
Carbon, 0.30% to 0.40% base.....	50
Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.	

FABRICATED STRUCTURAL STEEL

**New Projects of 49,000 Tons Include California Pipe Line—
Awards Total 21,000 Tons**

NEW fabricated structural steel projects total more than 49,000 tons this week, compared with 22,500 tons a week ago and 128,000 tons two weeks ago. In this week's total are 30,000 tons of plates in a fabricated pipe line, part of the Hetch Hetchy project in California. 4500 tons of fabricated steel for a Post Office at Kansas City, Mo., 1000 tons for a combined church and apartment building in New York, and 1000 tons each for highway bridges in New York and New Jersey.

Awards total 21,000 tons, the smallest since the third week of March. Included are 4500 tons in 30 steel barges for the W. H. Warner Coal Co., Cleveland, 3500 tons for a hotel in Oklahoma City, Okla., 1500 tons for two dredges at Memphis, Tenn., for the United States Engineer, and 1000 tons in a plant addition at the General Steel Casting Co., Eddystone, Pa. Awards follow:

North Atlantic States

BOSTON, 800 tons, Edison Illuminating Co. of Boston, Kneeland Street station, to New England Structural Co.

STATE OF NEW HAMPSHIRE, 320 tons, Sun Cook River bridge, to McClintic-Marshall Corp.

STATE OF CONNECTICUT, 200 tons, highway bridges, to American Bridge Co.

STATE OF NEW YORK, 300 tons, highway bridges in Broome County, to American Bridge Co.

FOREST HILLS, N. Y., 615 tons, apartment building, to Paterson Bridge Co.

YONKERS, N. Y., 275 tons, building for Yonkers Statesman, to Levine Iron Works, Yonkers, N. Y.

EDDYSTONE, PA., 1000 tons, addition to plant of General Steel Casting Co., to American Bridge Co.

WILKES-BARRE, PA., 225 tons, Nurses' Home, to Bethlehem Fabricators, Inc.

PHILADELPHIA, 900 tons, Walnut Street bridge, to McClintic-Marshall Corp.

BRADFORD, PA., 170 tons, I.O.O.F. building, to Griffith-Custer Co., Johnstown, Pa.

ELMIRA, N. Y., 270 tons, St. Joseph Hospital, to American Bridge Co.

TONAWANDA, N. Y., 550 tons, building for Lake Erie Engineering Co., to McClintic-Marshall Corp.

ERIE COUNTY, N. Y., 100 tons, bridge at Eden, to Buffalo Structural Steel Co.

PITTSBURGH, 250 tons, two barges for Sun Oil Co., to Nashville Bridge Co.

South and Southwest

MEMPHIS, TENN., 1500 tons, two dredges for United States Engineer, to Dravo Contracting Co.

TULSA, OKLA., 325 tons, salt plant, to Paterson Steel Co.

OKLAHOMA CITY, 3500 tons, Biltmore Hotel, to Mississippi Valley Structural Steel Co.

Central and Northwest

DAYTON, OHIO, 400 tons, bridge for Pennsylvania Railroad, to McClintic-Marshall Corp.

CLEVELAND, 4500 tons, 30 barges for W. H. Warner Coal Co., to Dravo Contracting Co.

DETROIT, 135 tons, 10 tanks for Adamson Mfg. Co., to Chicago Bridge & Iron Co.

STATE OF MICHIGAN, 400 tons, highway bridges, to American Bridge Co. and Elkhart Bridge & Iron Co.

EVANSVILLE, IND., 250 tons, two barges for Bedford-Nugent Co., to Nashville Bridge Co.

STATE OF INDIANA, 120 tons, highway bridge, to Vincennes Bridge Co.

STATE OF ILLINOIS, 1225 tons, highway bridges; 650 tons to Milwaukee Bridge Co., 475 tons to International Steel & Iron Co., 100 tons to American Bridge Co.

CHICAGO, 230 tons, North State Street viaduct, to Paschen Brothers.

CHICAGO, 250 tons, lock gates for Kampville and La Grange locks in Illinois River for United States Engineer, to Independent Bridge Co.

CHICAGO, 400 tons, compressor house for Peoples Gas Light & Coke Co., to an unnamed bidder.

STATE OF IOWA, 650 tons, bridges, to Clinton Bridge Co.; this is in addition to previous letting.

MILWAUKEE, 500 tons, technical school, to Wisconsin Bridge Co.

STATE OF SOUTH DAKOTA, 110 tons, bridge, to an unnamed bidder.

ST. LOUIS, 150 tons, dredge for Sternberg Dredging Co., to Nashville Bridge Co.

NORTH PLATTE, NEB., 150 tons, public service building, to Paxton & Vierling Iron Works.

Western States

PLEMMER, IDAHO, 250 tons, bridge, to Minneapolis-Moline Power Implement Co.

STATE OF CALIFORNIA, 155 tons, Little Creek bridge, to McClintic-Marshall Corp.

STRUCTURAL PROJECTS PENDING

Inquiries for fabricated steel work include the following:

North Atlantic States

PROVIDENCE, R. I., 300 tons, telephone building.

STAMFORD, CONN., 500 tons, office building.

STATE OF NEW YORK, 1000 tons, highway bridges; bids taken April 21.

STATE OF NEW JERSEY, 1000 tons, highway bridges.

NEW YORK, 250 tons, shed over ferry slip at Whitehall Terminal, South Ferry.

NEW YORK, 1000 tons, Metropolitan Temple, church and apartment building at Seventh Avenue and Thirteenth Street.

NEW YORK, 100 tons, store at 605 West 183rd Street for W. T. Grant Co.

BUTLER, N. J., 450 tons, factory for American Hard Rubber Co.

EAST ORANGE, N. J., 250 tons, Medical Building.

BLAUVELT, N. Y., unstated tonnage, convent and chapel for Dominican Sisters.

SYRACUSE, N. Y., 1000 tons, office building for Syracuse Lighting Co.

NORTH SALEM, N. Y., 100 tons, grade crossing elimination for New York Central.

IRVINGTON, N. Y., 500 tons, children's home.

WASHINGTON, 1000 tons, theater and stores for Warner Brothers, at Pennsylvania Avenue and C Street.

WASHINGTON, 1500 tons, Standard Oil Co. office building. Bids on general contract taken April 20.

BUFFALO, 1200 tons, Michigan Avenue bridge.

SAFE HARBOR, PA., 425 tons, fourth section of Safe Harbor bridge.

PITTSBURGH, 450 tons, Twenty-eighth Street bridge over Pennsylvania Railroad for city of Pittsburgh; bids May 5.

The South

ELLAMORE, W. VA., 125 tons, State highway bridge; bids April 21.

VICKSBURG, MISS., 100 tons, barge for United States Engineer; bids postponed from April 28.

STATE OF LOUISIANA, 1000 tons, two highway bridges.

Central and Northwest

CLEVELAND, 500 tons, city Tuberculosis Hospital.

STATE OF OHIO, 400 tons, four highway bridges.

MADISON, WIS., 750 tons, State emergency relief construction; bids April 21.

MANITOWOC, WIS., 300 tons, high school.

WILMETTE, ILL., 100 tons, Dubbs residence.

QUINCY, ILL., 400 tons, high school.

FORT CROOK, NEB., 300 tons, viaduct.

GRAND ISLAND, NEB., 500 tons, viaduct.

KANSAS CITY, MO., 4500 tons, Post Office.

Western States

LOS ANGELES, 650 tons, hospital addition, 2301 Bellevue Avenue; bids being taken.

SACRAMENTO, 113 tons, bridge over North Fork of Trinity River; bids May 6.

SAN FRANCISCO, 30,000 tons, plates, Hetch Hetchy pipe line; bids to be called soon.

▲▲▲ Non-Ferrous Metal Markets ▲▲▲

Copper Again Lower— Tin Declines—Zinc at 3.62½c.

NEW YORK, April 21.

COPPER

Weakness has again appeared in electrolytic copper, which is now available at 9.75c. a lb., delivered in the Connecticut Valley, with a few lots here and there obtainable at 9.50c. Yesterday the quotation of Copper Exporters, Inc., was lowered ¼c. to 10.05c., c.i.f. usual European ports. About 1800 tons was sold for export yesterday with fair sales today, which bring the total for the month to about 14,500 gross tons. This is about the same volume as for the corresponding period in March. Domestic demand is exceedingly light. Most of the primary producers are out of the market, with one or two of them still quoting 10c., delivered. Lake copper is quiet at 9.75c. to 9.87½c., delivered.

TIN

Prices continue to fall, and the lowest levels for the year thus far have been reached. London prices today were £110 17s. 6d. for spot standard, £112 5s. for future standard, which is a new low for this year, and £113 for spot Straits. The Singapore price today was £114 2s. 6d. All these prices are about £4 a ton less than a week ago. The low price for future standard in 1930 was £105 12s. 6d. Spot Straits tin today was quoted at 24.62½c., New York, which is a new low on this movement. On the decline, a fair business has been done with both consumers and dealers buying. Sales involved all positions into the last quarter. Too much metal, as revealed by statistics, is the principal cause of the weakness. Stocks in British warehouses on April 18 were 27,223 tons, a decline for the week of 62 tons. April shipments from the Straits up to the end of last week were 5750 tons.

LEAD

Demand is very light and confined to carload and small lots for early delivery. There is very little interest in the May position and it is estimated that about 6000 tons remain to be purchased for April shipment. Prices are unchanged at 4.25c., St. Louis, or 4.50c., New York. Announcement was made yesterday of an agreement to curtail output 15 per cent beginning

THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY

	Apr. 21	Apr. 20	Apr. 18	Apr. 17	Apr. 16	Apr. 15
Lake copper, New York.....	9.87½	9.87½	10.12½	10.12½	10.12½	10.12½
Electrolytic copper, N. Y.*.....	9.50	9.50	9.50	9.50	9.50	9.75
Straits tin, spot, N. Y.....	24.62½	24.62½	.....	25.00	24.87½	25.20
Zinc, East St. Louis.....	3.62½	3.62½	3.65	3.65	3.70	3.75
Zinc, New York.....	3.97½	3.97½	4.00	4.00	4.05	4.10
Lead, St. Louis.....	4.25	4.25	4.25	4.25	4.25	4.25
Lead, New York.....	4.50	4.50	4.50	4.50	4.50	4.50

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

May 1 and to run six months. No details are officially given.

ZINC

With prime Western zinc selling at 3.62½c. a lb., East St. Louis, a new low level for many years was reached, much to the surprise of many in the industry. Offerings, however, are not large, and are chiefly for the forward positions. Ore prices were down at the week-end about \$2 a ton to \$21 to \$22, Joplin. Shipments were about 7160 tons, with production 6000 tons, reducing stocks to about 56,200 tons, as compared with 57,350 tons a week ago.

ANTIMONY

In a quiet market, Chinese metal for prompt shipment is quoted at 6.85c. a lb., duty paid, New York.

NICKEL

Electrolytic cathodes are quoted at 35c. a lb., with shot and ingot made from remelted electrolytic at 36c. a lb. for single lots of spot metal.

ALUMINUM

Virgin metal, 98 to 99 per cent pure, is obtainable at the published price of 22.90c. a lb., delivered.

New York, Chicago or Cleveland Warehouse

Delivered Prices, Base per Lb.

High brass	17.25c.
*Copper, hot rolled, base sizes.....	19.87½c.
Seamless Tubes—	
Brass	20.12½c.
Copper	22.37½c.
Brass Rods	15.50c.
Brazed Brass Tubes.....	25.12½c.

*Extra for cold-rolled, 3c. per lb.

New York Warehouse

Delivered Prices, Base per Lb.

Zinc sheets (No. 9), casks	9.75c. to 10.25c.
Zinc sheets, open.....	10.75c. to 11.25c.

Metals from New York Warehouse

Delivered Prices, per Lb.

Tin, Straits pig.....	26.00c. to 27.00c.
Tin, bar	28.00c. to 29.00c.
Copper, Lake	11.00c. to 11.50c.
Copper, electrolytic.....	10.75c. to 11.25c.
Copper, casting.....	10.50c. to 11.00c.
Zinc, slab.....	5.00c. to 6.00c.
Lead, American pig.....	5.50c. to 6.50c.
Lead, bar.....	7.50c. to 8.50c.
Antimony, Asiatic	10.00c. to 10.50c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure).....	24.00c. to 25.00c.
Alum. ingots, No. 12 alloy	23.00c. to 24.00c.
Babbitt metal, commercial grade	25.00c. to 35.00c.
Solder, ½ and ½.....	19.00c. to 20.00c.

Metals from Cleveland Warehouse

Delivered Prices, per Lb.

Tin, Straits pig.....	29.50c.
Tin, bar	31.50c.
Copper, Lake	11.13c.
Copper, electrolytic.....	11.13c.
Copper, casting	10.63c.
Zinc, slab.....	5.50c.
Lead, American pig.....	5.25c. to 5.40c.
Lead, bar.....	8.00c.
Antimony, Asiatic	10.50c.
Babbitt metal, medium grade.....	15.75c.
Babbitt metal, high grade.....	33.50c.
Solder, ½ and ½.....	19.75c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has been properly prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	7.75c.	8.75c.
Copper, hvy. and wire	7.50c.	8.50c.
Copper, light and bot- toms	6.50c.	7.25c.
Brass, heavy.....	4.50c.	5.50c.
Brass, light.....	3.75c.	4.75c.
Hvy. machine compo- sition	6.75c.	7.50c.
No. 1 yel. brass turn- ings	5.00c.	5.50c.
No. 1 red brass or compos. turnings..	6.50c.	7.25c.
Lead, heavy	3.25c.	3.75c.
Lead, tea.....	2.00c.	2.50c.
Zinc	1.50c.	2.00c.
Sheet aluminum.....	10.00c.	12.00c.
Cast aluminum.....	5.00c.	7.50c.

Reinforcing Steel

Awards 5150 Tons—New Projects of 6000 Tons

LETTINGS of reinforcing steel the past week were slightly under those in the previous week, totaling about 5150 tons. Contracts were for miscellaneous work and involved no tonnages of size. The largest, 1000 tons, is for highway construction in New York State. New pending work will take 6000 tons, compared with 3200 tons last week. Two jobs of 1000 tons each include a grain elevator in Chicago and coverings for two storage reservoirs for the St. Louis municipal waterworks. Awards follow:

STATE OF VERMONT, 700 tons, road work, to Truscon Steel Co.
NORTHBORO, MASS., 100 tons, State bridge, to Concrete Steel Co.
WHITE PLAINS, N. Y., 125 tons, office building for Westchester County, to Carroll-McCreary Co.
STATE OF NEW YORK, 1000 tons, highway bridge work, to Capital Steel Co., Brooklyn.
ROCHESTER, N. Y., 100 tons, Colgate Divinity School, to Genesee Bridge Co.
WASHINGTON, 120 tons, Klinge Valley bridge, to Hudson-Dougherty Co., Washington.
SPRINGFIELD, OHIO, 500 tons, hospital, to Truscon Steel Co.
CLEVELAND, 500 tons, Huron Road Hospital, to Truscon Steel Co.
STATE OF ILLINOIS, 500 tons, road work, to Calumet Steel Co.
CHICAGO, 150 tons, substation for Commonwealth Edison Co., to Joseph T. Ryerson & Son, Inc. This was incorrectly used as a structural item last week.
ST. LOUIS, 325 tons, Nurses' Home for City Hospital, to Missouri Rolling Mills Corp.
ASTORIA, ORE., 100 tons, St. Marys Hospital, to Mercer Steel Co.
OLYMPIA, WASH., 100 tons, State road No. 3, to Northwest Steel Rolling Mills.
TACOMA, WASH., 200 tons, State bridge, to an unnamed bidder.
SEATTLE, 250 tons, addition to American Can Co. plant, to Northwest Steel Rolling Mills.
SEATTLE, 350 tons, garage on Sixth Avenue, to an unnamed company.
SACRAMENTO, 123 tons, paving in Santa Barbara County, to unnamed bidder.
POMONA, CAL., 100 tons, office building on Holt Avenue, to an unnamed bidder.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

NEW YORK, 1000 tons, anchorages for Tri-Borough Bridge; bids rejected and new bids to be taken.
NEW YORK, 100 tons, grade crossing elimination at Clifton, Staten Island. W. H. Gahagan, Inc., low on general contract.
NEW YORK, 300 tons, cold storage warehouse for New York Central Railroad. Aronberg-Fried Co., reported low on general contract.
YONKERS, N. Y., 100 tons, grade crossing elimination at McLean Avenue. Bids in.

STATE OF NEW JERSEY, 450 tons, highway construction route S-1-A; general contractor, Giovanni Construction Co.

STATE OF NEW JERSEY, 100 tons, bridge on route 5 at Fort Lee; United Bridge & Construction Co. low on general contract.

HOMDEL, N. J., 150 tons, hospital building.

PHILADELPHIA, unstated tonnage, building for Barret Co.; Turner Construction Co., general contractor.

WASHINGTON, 130 tons, bridge at Connecticut Avenue.

WASHINGTON, 250 tons, Standard Oil Co. office building; bids on general contract taken April 20.

WASHINGTON, 170 tons, warehouse for Thomas Somerville Co.; Skinner & Garrett, Washington, general contractors.

WASHINGTON, 220 tons, Pennsylvania Railroad tunnel under Arlington Memorial bridge. Bids taken April 20 by J. H. Coleman, Clarendon, Va., general contractor.

CLEVELAND, 150 tons, building for Cleveland Provision Co.

CHICAGO, 1000 tons, grain elevator; James Stewart Corp., general contractor.

CHICAGO, 600 tons, outer bridge; bids taken April 24.

CHICAGO, 325 tons, Harlem Avenue bridge.

WINNETKA, ILL., tonnage being estimated, addition to new Trier High School.

AURORA, ILL., 250 tons, hospital.

MADISON, WIS., 950 tons, State emergency relief construction; bids close April 21.

JEFFERSON CITY, MO., 500 tons, highway work for Missouri Highway Commission; bids opened May 2.

ST. LOUIS, 1000 tons, coverings for two storage reservoirs at Compton Hill reservoir of municipal waterworks plant; bids opened April 28.

SACRAMENTO, 138 tons, paving in Los Angeles County; bids opened.

SACRAMENTO, 100 tons, paving in Placer County; bids May 6.

Cleveland Iron and Steel Market

(Concluded from page 1399)

schedules, specifications from the Ford Motor Co. are falling off. Business in this territory continues to be slow. Some of the steel furniture manufacturers are taking a fair tonnage. Enameling plants are quiet. Black sheets range from 2.15c. to 2.25c., Pittsburgh, the lower price having become more common for the automotive industry in Detroit. Auto body sheets have settled to a flat 3.10c. price.

OLD MATERIAL

No activity by consumers has followed the recent price reductions. Quotations this week are unchanged but nominal. Local mills are taking no scrap from dealers and very little is being taken by other Ohio mills. Unless shipping orders come out more freely soon, some expect a further decline in prices. Dealers are buying a

little compressed sheet steel scrap for Pittsburgh delivery at \$11.25.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:
No. 1 heavy melting steel... \$9.75 to \$10.25
No. 2 heavy melting steel... 9.50 to 9.75
Compressed sheet steel... 8.50 to 9.00
Light bundled sheet stampings... 7.00 to 7.50
Drop forge flashings... 7.50 to 8.00
Machine shop turnings... 4.50 to 5.00
Short shoveling turnings... 6.75 to 7.00
No. 1 railroad wrought... 9.50 to 10.00
No. 2 railroad wrought... 10.00 to 10.50
No. 1 busheling... 8.00 to 8.50
Pipes and flues... 5.50 to 6.00
Steel axle turnings... 8.00 to 8.50

Acid Open-Hearth Grades:
Low phos., billet bloom and slab crops... 14.00 to 14.50

Blast Furnace Grades:
Cast iron borings... 6.50 to 7.00
Mixed borings and short turnings... 6.50 to 7.00
No. 2 busheling... 6.25 to 6.50

Cupola Grades:
No. 1 cast... 12.00 to 12.50
Railroad grate bars... 6.00 to 6.50
Stove plate... 6.00 to 6.50
Rails under 3 ft... 15.00 to 15.50

Miscellaneous:
Rails for rolling... 13.00 to 13.50
Railroad malleable... 12.00 to 12.50

New Trade Publications

Roller Bearings.—Shafer Bearing Corp., 6501 West Grand Avenue, Chicago. A 16-page, loose-leaf booklet, 9 x 11½ in., catalog No. 11. Illustrates and provides specifications on "self-aligning" roller bearing units for various applications. Freedom from friction is claimed and consequent maximum power transmission.

Pumps and Engines.—Worthington Pump & Machinery Corp., Harrison, N. J. Eight publications on pumps and engines, dealing with vertical, triplex single-acting pumps, deep well, power vacuum, centrifugal pumps and rock drills.

Screw Products.—Union Screw & Mfg. Co., 207 South Main Street, Pittsburgh. A new catalog showing the list prices on cap and set screws, nuts and studs. It also contains lists of standard thread sizes, weights of steel and brass bars, net discounts and other information.

Pulverizers.—Fuller Lehigh Co., Fullerton, Pa. Bulletin 5-30 devoted to construction and operation of company's Type B pulverizer. Outstanding features include the spherical ball and grinding ring principle of pulverizing in which fineness is not affected by wear of grinding parts and the enclosure of all parts requiring lubrication is in dust-and-oil-tight housings apart from the grinding zone.

Wrought Iron.—A. M. Byers Co., Pittsburgh. Brochure entitled "An Important Contribution to Metallurgy," which briefly describes the Byers method for the mechanical manufacture of wrought iron. Outstanding features have previously been described in technical articles appearing in these columns.

Portable Airbrush Units.—Paasche Airbrush Co., 1909 Diversey Parkway, Chicago. Folder illustrating and giving the specifications of electric and gasoline-operated paint sprays. Included is a record of a time study made in a Cleveland plant of spraying from a 60-gal. compared with a 7-gal. tank.

NEW TRADE PUBLICATIONS

Unit Heaters.—Young Radiator Co., Racine, Wis., Booklet H-1230 describes unit heaters ranging from smallest size to largest. These units are suitable for heating small rooms to the largest buildings and factories, with special equipment for garages, warehouses and airplane hangars.

Pipe Bending.—A. M. Byers Co., Clark Building, Pittsburgh. Bulletin No. 59, 16 pages, 8½ x 11 in., devoted to the practice and theory of bending wrought iron pipe. The pamphlet is well illustrated with diagrams.

Heat Treating.—Chicago Flexible Shaft Co. "Stewart Melting Pot" is the title of a 30-page booklet which gives various methods of heat treating as used by that company.

Recuperator.—Carborandum Co., Perth Amboy, N. J., a 4-page illustrated leaflet describes the application of this company's recuperator to an air furnace at the plant of the Cadillac Malleable Iron Co., Cadillac, Mich. Results of the use of this recuperator in cutting down operating time and costs are given.

Rustless Steel Tubes.—Babcock & Wilcox Tube Co., Beaver Falls, Pa. A beautifully illustrated 55-page booklet entitled "B & W Nirosta KA2," giving complete data of that company's product and describing the working qualities, the resistance to corrosion in various solutions and under various conditions, the stability of elevated temperatures and the design of tubes for high temperatures. There is also a section giving data taken from actual operating records.

Hydraulic Lift Truck.—Lyon Iron Works, Greene, N. Y. Bulletin 105 of four pages introducing the Lyon hydraulic lift truck, which lifts and lowers hydraulically; capacity, 6000 lb.

Damper Regulators.—Atlas Valve Co., 286 South Street, Newark, N. J. 12-page illustrated bulletin covering three types of damper regulators: No. 501, for low-pressure and vapor heating boilers; No. 502, for medium-pressure power boilers; No. 503, for high-pressure power plants.

Check Valves.—Smolensky Valve Co., Cleveland. Bulletins Nos. 8 and 9, eight pages each, illustrating and describing two different types of valves. In the straightflow lock valve the valve seat is hidden; said to permit the manufacture of any style of valve. The radialflow noiseless check valve is specially constructed to eliminate "head loss."

Storage Tanks.—United Conveyor Corp., Old Colony Building, Chicago. Illustrated catalog of 16 pages, featuring the United vitrified glazed tile ash storage tanks. Table of standard tank sizes is included.

Emergency Lighting System.—Roth Brothers & Co., 1400 West Adams Street, Chicago. Circular describing the Century-Roth emergency lighting system, said to be applicable to any building, room, industry or condition where continuous illumination or standby power is essential or desirable.

Induction Motors.—General Electric Co., Schenectady, N. Y. Folder GEA-

1368 illustrates and describes types K and KF vertical, hollow-shaft induction motors for deep-well pumping. Features are double-end ventilation, streamline exterior, optional coupling devices (either solid or pin-type couplings), oil lubrication, easy adjustment of pump shaft.

Centrifugal Pumps.—Duriron Co., Dayton, Ohio. Bulletin 164 of four pages describing No. 40 and self-priming No. 50 centrifugal pumps, for use in acid service and where corrosion is a factor—recommended for both corrosion and erosion.

Steel Castings.—Los Angeles Steel Casting Co., Ltd., Los Angeles, Cal. A 4-page leaflet describes the properties of Nikeladium, an alloy steel casting, and its three partners, which have recently been developed to present various combinations of strength and toughness of this special product.

Pyrometers.—Brown Instrument Co., Philadelphia. A beautifully illustrated catalog of 59 pages contains the latest data on automatic controls for temperatures, pressures, flows, liquid levels and other vital process operating factors, manufactured by the above company.

Decorative Lighting.—Crouse-Hinds Co., Syracuse, N. Y. Bulletin 2226 featuring several types of floodlights for buildings and gardens.

Hoists.—Union Mfg. Co., New Britain, Conn. Circular and price list illustrating and describing several types of high-speed lift hoists.

Seamless Steel Tubing and Cold-Drawn Steel Products.—Julius Blum & Co., Inc., 532-540 West Twenty-second Street, New York. Catalog of 112 pages, attractively illustrated, dealing with a long list of products, such as aluminum moldings, casements and sash bars, stair posts, Swedish iron, tubing, zee bars, etc.

Designing and Building Gas Lines.—A. O. Smith Corp., Milwaukee. Bulletin 519 of 52 pages, containing a great deal of technical data and information on pipe and pipe lines.

Revolving Car Dumpers.—Wellman Engineering Co., Cleveland. Bulletin 93 of 11 pages, illustrating and describing revolving car dumpers, provided with automatic gravity-operated clamps. Four-clamp machine handles cars up to 120 tons capacity; the two-clamp machine, up to 75 tons capacity.

Engineering Service.—E. Y. Sayer Engineering Corp., Broadway and Forty-second Street, New York. 24-page booklet dealing with engineering—design, drafting, construction, reports.

Dust Sampler.—Dust Recovery, Inc., 15 Park Row, New York. Folder illustrating and describing the Bagtest dust sampler—a portable dust sampling apparatus, containing all instruments necessary to determine the dust loading of gases under varying conditions. It can be applied to flues in any part of a system.

Turbine Protecting Valves.—Schutte & Koerting Co., Philadelphia. Catalog of 28 pages describing bleeder line

protecting valves designed for use in the extraction lines leading from bleeder turbines to boiler feed-water heaters, heating systems or process equipment. The bulletin gives considerable data regarding construction features, sizes, prices and typical installations.

Angle Steel and Sheet Metal Equipment.—Angle Steel Stool Co., Plainwell, Mich. Catalog M-S 1931 featuring angle steel and sheet metal equipment for factory, shop and office use. Tables give sizes, weights and prices.

Generators and Steam Engines.—Troy Engine & Machine Co., Troy, Pa. Booklets 602 and 304 of 23 pages each, illustrating and describing bracket and engine types of generators for direct and alternating current, and vertical steam engines for stationary and marine service, single and twin cylinder.

Worm-Gear Speed Reducers.—D. O. James Mfg. Co., 1114 West Monroe Street, Chicago. Booklet of 31 pages showing four sizes of small heavy-duty worm-gear reducers. Complete information is given as to dimensions and horsepower rating at various speeds, and many installations are shown.

Blast Gates.—Ryan, Scully & Co., 3711 Wissahickon Avenue, Philadelphia. Bulletin 7 of four pages dealing with blast gates, butterfly type, for the control of air or gas at pressures up to 15 lb.

Multi-V-Drives.—Worthington Pump & Machinery Corp., Harrison, N. J. Circular describing Multi-V-Drives, developed primarily to meet the need for a more efficient, shock-absorbing, vibrationless drive for compressors and pumps.

Sheet - Metal - Working Machines.—Niagara Machine & Tool Works, 697 Northland Avenue, Buffalo. Circular 376 of eight pages, illustrating and describing several types of electric combination machines for burring, turning, wiring, beading, crimping, slitting, flanging, elbow edging, etc.

Compressor Control.—Pennsylvania Pump & Compressor Co., Easton, Pa. Bulletin 102 features dual compressor control, to meet varying demands for compressed air. Compressor can be operated for either maximum or minimum demand.

Equipment for Power Stations.—Atlas Car & Mfg. Co., Cleveland. Bulletin 1237 of 15 pages covers equipment for power plants, such as storage-battery locomotives, transformer transfer cars, rotor cars, dump bottom coal cars, side delivery scale cars, turntables, etc.

Adjustable Hollow Mills.—Gairing Tool Co., 1620 West Lafayette Boulevard, Detroit. Folder illustrating and describing adjustable-blade hollow mills, introducing new principles of design to increase the efficiency of turning, facing and shoulder cutting.

Interferometers.—Gaertner Scientific Corp., Chicago. An illustrated pamphlet of 48 pages entitled "Interferometers and Interference Apparatus," issued as catalog No. 1, describes the various apparatus of this nature manufactured by this company.

Metal Curbing.—American Rolling Mill Co., Middletown, Ohio. Four-page leaflet setting forth the advantages of "Metalcurb," a new product of this company which can be used on many types of road construction.

British Committee Reports on Complete Redistribution of Steel Output

(By Cable)

LONDON, ENGLAND, April 20.

PRESIDENT GRAHAM of the Board of Trade in explaining the reasons for the refusal of the Government to adopt tariffs on iron and steel says that the proposal was fully investigated under the previous administration of the Conservative party, and it was found that such a comprehensive problem would develop as to require a substantial revision of Great Britain's entire fiscal policy. The present Government holds no mandate for such a change, and in consequence tariffs have been refused.

A report just made by the Economic Advisory Council is confidential, says Mr. Graham, but in Parliament it was stated that the object of the report is to secure far-reaching reorganizations and mergers, and geographical redistribution of production. Authorities in industry, Mr. Graham continues, have generally favored regional reorganization by concentration of output in four units situated in Wales, the Northeast Coast, the Midlands and Scotland.

High financial authorities have urged that a tariff would be likely to bring a cessation of progress in reorganization of the steel industry, while a substantial minority have claimed that the necessary capital for such changes cannot be provided until a larger proportion of the British market is assured than at present.

The Weir Committee, which was

British committee recommends complete electrification of all railroads, to cost \$2,000,000,000.

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Germany booked more than \$1,500,000 of Soviet steel orders in first half of March.

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Swedish steel mill to furnish German razor blade makers with same grade of strip steel sold to American company.

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Motor boat, Miss England II, contains chrome-nickel-molybdenum steel of high tensile strength.

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appointed by the Government to advise on electrification of the British railroads, has recommended complete electrification of all systems at an estimated total cost of £400,000,000 (\$1,944,000,000) over a period of 15 years, and providing continuous employment to about 60,000.

A Government survey under direction of Professor Hallsworth, economist at Armstrong College, will be started soon to determine the possibilities and need for new industries on the Northeast Coast. The survey

is expected to be complete by the end of this year.

Steel mills held a conference last week, but by previous agreement prices were not discussed. Mills are greatly in need of shipbuilding specifications and but few mills are maintaining regular operating schedules. Prospects of Clyde shipyards securing Soviet Union contracts are diminishing, as the shipbuilders are unable to grant the required credit terms.

Welsh tin plate mills reached a decision last week to continue the plan of pooling output and maintaining production quotas until June 13, but declined to adopt suggestions made for increasing penalties for overproduction. The ultimate fate of this conference will remain undecided until the June meeting of the mills. Meanwhile an advisory committee is to investigate the whole plan of pooling and report in June.

Consumers of tin plate have been displaying moderate interest in buying and have placed considerable small lot business at about 15s. (\$3.65) per base box, f.o.b. works port. Certain users have covered their requirements to the end of the year, and inquiry is expanding.

Continental market prices are firmer, although sales to British users are at present negligible. India, China and Japan have been moderate buyers, and mills which have booked some of this business are in a better

British and Continental European Export Prices per gross ton, f.o.b. United Kingdom Ports, Hamburg and Antwerp with the £ at \$4.8665 (par)

British Prices, f.o.b. United Kingdom Ports				Billets, Thomas (nominal) £3 10s. to £3 11s. \$17.01 to \$17.25			
Ferromanganese, export, £9 0s. to £11 5s.			\$43.74 to \$54.75	Wire rods, low C., No. 5	5 2½ to 5 7½		24.94 to 26.15
Billets, open-hearth....	5 5 to 5 10		25.52 to 26.76	B.W.G.	6 0		29.20
Black sheets, Japanese specifications	10 10 to 10 15		51.03 to 51.63	Rails, light	11 5 to 12 12		54.68 to 58.32
Tin plate, per base box..	0 15 to 0 15½		3.65 to 3.77	Black sheets, No. 31 gage, Japanese.....	11 5 to 12 12		54.68 to 58.32
			Cents a Lb.				Cents a Lb.
Steel bars, open-hearth..	7 17½ to 8 7½		1.71 to 1.81	Steel bars, merchant....	3 17 to 3 19		0.83 to 0.85
Beams, open-hearth....	7 7½ to 7 17½		1.60 to 1.71	Beams, Thomas, British standard (nominal)...	3 10 to 3 12½		0.78 to 0.80
Channels, open-hearth..	7 12½ to 8 2½		1.66 to 1.76	Channels, Thomas, American sections.....	5 12 to 5 14		1.24 to 1.26
Angles, open-hearth....	7 7½ to 7 17½		1.60 to 1.71	Angles, Thomas, 4-in. and larger, over ¾-in. thick	3 16 to 3 17		0.82 to 0.83
Black sheets, No. 24 gage	8 10 to 8 10		1.84	Angles, Thomas, 3-in....	3 18 to 3 19		0.84 to 0.85
Galvanized sheets, No. 24 gage	11 0 to 11 0		2.42	Hoop and strip steel over 6-in. base.....	4 7½ to 5 0		0.94 to 1.10
Continental Prices, f.o.b. Antwerp or Hamburg				Wire, plain, No. 8 gage..	5 0 to 5 0		1.10
Foundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phos.	£2 9s. to £2 10s.		\$11.90 to \$12.15	Wire, barbed, 4-pt. No. 12 B.W.G.	9 0 to 9 0		1.91

position. Japanese consumers have been particularly interested in shapes and this has resulted in a firmer tone in the market for semi-finished steel.

The Egyptian Government is seeking bids on 5500 tons of rails. The Government of South Africa is proposing the purchase this year of 170 locomotives and 7000 cars.

British pig iron markets are quieter with consumers less inclined to buy for more than immediate requirements. Demand is mostly limited to domestic consumers, export buying being negligible.

Guest, Keen & Nettelfolds, Ltd., has passed its ordinary dividend, in contrast to 10 per cent paid for the past eight years.

German production in March was 560,000 tons of pig iron and 811,000 tons of raw steel. In the first half of March the purchases by the Soviet Union in Germany included 6000 tons of plates, 1,500,000 m. (\$358,500) worth of wire rope and tubing, and 4,000,000 m. (\$956,000) worth of other steel products.

Under the name Ateliers et Chantiers de la Loire, a Jugoslavian shipbuilding and repairing company has been registered in Belgrade with capital of 6,000,000 dinars (\$105,000).

Speed Boat Contains Special Alloy Steels

LONDON, ENGLAND, April 11.—The motor boat Miss England II, which recently established a new marine speed record at Buenos Aires, Argentina, is equipped with a drop-forged crankshaft made in Sheffield, with tensile strength of 130,000 to 135,000 lb. per sq. in. The same grade of steel is in the engine, clutch, steering and propelling machinery. The propeller, which is driven at 12,000 r.p.m., is a chrome-nickel-molybdenum steel forging furnished by the English

Steel Corp'n. The same alloy, which may be heat treated to a tensile strength of 224,000 lb. per sq. in., is used for the rudders.

Americans Inquire for German Cotton Ties

HAMBURG, GERMANY, April 9.—German manufacturers of cotton ties report a substantial amount of inquiry from importers and distributors in the United States. It is suggested that, under the present schedule of Continental prices, the German product could be exported to the United States at well under the American mill price, unless the cotton tie quotation is established at a lower level than is indicated by present steel prices.

Urge Abolishing Credit Guarantees with Soviet

HAMBURG, GERMANY, April 9.—Although the U. S. S. R. is one of Germany's best customers abroad for machinery and iron and steel products, business is possible only because the German Government guarantees 70 per cent and State governments an additional 5 to 10 per cent of the invoice. At present the Nationalist party and others are urging abolition of this guarantee on business with the Soviet, claiming the risk is too great, as the Government always has credit guarantees outstanding on this business of more than 250,000,000 m. (\$59,500,000). Many German manufacturers are opposing abolition of the credit guarantees, pointing out that about 70 per cent of Germany's foreign business in machinery and equipment has recently been with Russia.

German Machine Makers Use Pressed Steel

HAMBURG, GERMANY, April 9.—The machinery exhibit at the Leipzig Fair in March reflected a decided trend in the use of pressed steel for various machines. This was especially evident in the electrical equipment division, where the entire frame of small motors was in many cases of pressed steel, and on the larger motors welded steel plates were employed.

Many machine tools exhibited were largely constructed of welded plates or pressed steel. While it is claimed that the use of pressed steel for machine construction represents no material saving in cost, there is a reduction in total weight, which is of importance in export trade, because of freight costs.

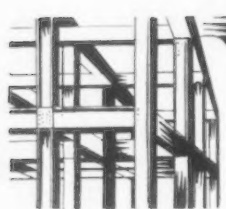
Certain manufacturers claim that they can deliver their machines to Japan at a 2.75 per cent lower c.i.f. price than formerly because of lighter construction.

German Razor Makers to Use Swedish Steel

HAMBURG, GERMANY, April 9.—A contract has been signed between the Sandviken A. B., Remscheid, a subsidiary of the large Swedish works, Sandviken A. B., and a group of 25 German razor blade manufacturers. The contract provides for delivery of steel for the new standardized razor blade recently agreed upon by the members of the German Razor Blade Manufacturers' Association. It is understood that the Swedish company will furnish the same quality of steel to a large American razor blade maker.



Japan's longest railroad bridge is 4320 ft. in length and carries the double tracks of the electrified Tokaido division of the Imperial Government Railways over the Ohi River, midway between Tokio and Nagoya.



PLANT EXPANSION AND EQUIPMENT BUYING



Machine Tool Activity Not Gaining This Month

March Business, However, Was
Best of the Year, Representing
Substantial Increase

NO change was evident in the rate of activity of machine tool sales during the past week. Slightly increased interest on the part of equipment users in the Midwestern territory, resulting in some sales and a larger number of inquiries, has been offset by reports of increased dullness from other districts.

The seasonal upturn noted in March has not carried through, according to present evidence, and April will do well to maintain the March level of demand.

According to the monthly report of the National Machine Tool Builders' Association, covering conditions to March 31, sales made during the first quarter of this year increased the

level of machine tool orders from its low of 65.3 per cent at the end of December (represented by the three months' moving average) to 89.4 per cent at the end of March. The March index figure was 117.6, compared with 83.7 for February and 66.9 for January. The low point of the past year was November, 1930, at 60.4. Comparison is made with the average monthly shipments for 1922, 1923 and 1924, which are taken as base, or 100.

The best showing during March was made by the group comprising the smaller companies. These approximately doubled their February business and had a March volume that was ahead of their monthly average for 1930.



NEW YORK

Machine tool business in the Eastern district has settled down to a dull routine, in which there is little to look forward to except the single tool orders that filter in occasionally. The aggregate of business during the first half of April was somewhat disappointing, not having measured up in most instances to the average volume of March. As seasonal business recovery has apparently not gone far enough to bring prospective purchasers into the market in any volume, the general opinion of machine tool sellers is that business will go along at about its present slow pace until the fall at the earliest.

NEW ENGLAND

The slight improvement in sales reported by dealers a week or so ago has not continued and the market has again reverted to quietness. In some cases the spurt in business equaled that in early March, but indications are that the greater part of the trade will have a lean month. A number

of New England machine tool builders report an improvement in bookings, but the betterment is comparatively slight and confined largely to certain types of tools.

That metal-working shops are busier than a month ago is attested by the increase in small tool sales. The average shop, however, is buying such equipment on a hand-to-mouth basis.

CLEVELAND

The local machine tool market continues dull and sales in April are not expected to show any gain over March. Two vertical boring mills were bought the past week by a manufacturer in this territory, and the Hercules Motor Co., Canton, purchased several used tools against its recent list. Some business in new type of machine tool equipment for manufacturing tire molds is in prospect from the rubber industry. Inquiry is light and confined mostly to single machines for replacement. However, business of this character is slow in being placed.

According to the association, the better tone in March is reflected in an improvement in the index of unfilled orders, which, however, at the end of last month represented only two and a half months' unsatisfied demand. This index on March 31 stood at 225.1, compared with 203 at the end of December and 204.4 at the end of February.

Notable improvements in design and operating efficiency have been made in many lines of tools and other industrial equipment during recent months, and it is expected that this fact will stimulate the reequipping of plants as soon as industrial executives realize the necessity of preparing for increased competition by effecting substantial cost reductions.

CHICAGO

The local machine tool market is enlivened by several orders long pending and an upturn in inquiries. A Chicago machine tool user has contracted for a large planer, a lathe and a shaper, and a Milwaukee manufacturer has ordered a large planer. For the most part inquiries are scattered but it is reported that at least two sizable industrial lists are in the making. The motor car industry, although inactive in the machinery market at present, is laying plans for fall changes in models which may be productive of machine tool orders. It is probable that next week the Santa Fe will begin to purchase against its list. Active bidding by users and dealers, with resultant high prices, was a feature at the auction sale of the equipment of the L. S. Gordon Co., Chicago.

CINCINNATI

The machine tool market continues to reflect the general apathy of users toward new purchases. While occa-



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sional single orders continue to be received by local manufacturers, demand is still dull and unsatisfactory. Production, on the whole, remains at the same low level, although in some instances there have been reports of slight increases in operations. Inquiry has begun to slacken as buyers' interest becomes more influenced by their order books.

MILWAUKEE

Machine tool business lacks special characteristics, but the fact that the trend continues upward, even if only slowly, is considered a good sign. For the present not much business other than that to meet urgent replacement needs is being received. However, energetic selling effort with respect to newly developed high speed, high production tools is bearing fruit and such sales, while not in large volume, are satisfactory.

PITTSBURGH

Machine tool orders this month are not much, if any, better than in

March, and aggregate business with some sellers is definitely lower. Orders for single tools predominate, and repair parts are in considerable demand. Some equipment purchases, which had been deferred pending a possible revival in business this spring, have again been postponed and talk of heavier business in the fall is heard.

Inquiry is also lighter than in the early months of the year. The volume of pending business is lower as some companies have taken action against inquiries and others have definitely postponed buying. The Westinghouse Electric & Mfg. Co., East Pittsburgh, has issued its inquiry which includes about 15 items. No immediate action is expected. Machinery sellers are still active in plant missionary work in an effort to create machine tool wants. In some cases this work is especially hopeless as prospective buyers are quite willing to admit that suggested changes would be beneficial but say that no funds are available.



New York

PLANS are being completed by Department of Water, Gas & Electricity, Municipal Building, New York, for two-story service and mechanical shop at Long Island City, 50 & 150 ft., to cost close to \$60,000 with equipment. It is understood that bids will be asked next month. Daniel Campbell, Jr., 154 Amity Street, Flushing, L. I., is architect.

Superintendent of Lighthouses, Third District, Staten Island, N. Y., is asking bids until April 30 for one Diesel propelling engine and two auxiliary compressors; until April 27 for 9 bell buoys, 9 ft. diameter and 15 ft. long, with skeleton steel bell frame and bottom counterweight, and for 16 cast iron, 5000-lb. sinkers, each with forged mooring eye cast in; until May 4 for 144 15-fathom pieces, $\frac{3}{4}$ to $1\frac{1}{2}$ in., open link iron buoy chain, total weight about 154,000 lb.

Bureau of Repairs and Supplies, Fire Department, Municipal Building, New York, Hubert J. Treacy, chief, is considering purchase of 4 acres of waterfront property on East River, Brooklyn, as site for new centralized fire department school, repair shops and training camp, including three-story administration unit, several one-story machine and mechanical shops, practice building with jumping tower, testing shop and field for new equipment, and facilities for marine fire apparatus, to cost over \$2,000,000 with equipment.

New York Metal Products Co., Inc., New York, has been organized to take over and expand company of same name with local works at 303 Cherry Street. Gabriel Dapice is principal incorporator of new company.

Associated Gas & Electric Co., 61 Broadway, New York, operating electric light and power utilities, is arranging for new bond issue to total about \$32,000,000, part of fund to be used for expansion and improvements, including acquisition of additional properties.

Matthew W. Del Gaudio, 545 Fifth Avenue, New York, architect, has plans for a

four-story automobile service, repair and garage building, 50 x 180 ft., to cost close to \$140,000 with equipment.

Signal Supply Officer, United States Army Base, Brooklyn, is asking bids until April 29 for 10,000 knives; until May 8 for brass rivets, transformers, resistors, switches, etc.

Lupo Column Co., 913 Grand Street, Brooklyn, manufacturer of building columns, has plans for one-story factory, 120 x 175 ft., to cost over \$50,000 with equipment. Murray Klein, 65 Court Street, is architect.

William R. Murphy, 224 Elm Avenue, Hackensack, N. J., and associates have organized Enterprise Engineering Co., Brooklyn, with capital of \$20,000, to operate local plant for manufacture of oil burners and oil-burning equipment.

Board of Education, Passaic, N. J., is planning installation of manual training equipment in new two-story and basement high school to cost about \$1,000,000, for which plans will be drawn by John F. Kelly, Post Office Building, architect.

Crystal Oil Burner Corp., 679 South Fifteenth Street, Newark, has leased one and two-story buildings at Irvington, N. J., totaling about 12,000 sq. ft. floor space for new plant and will remove to new location and increase capacity. F. W. Hohensee is president, and Karl E. Hohensee, secretary.

Fred P. Reagle, secretary, Board of Education, 22 Valley Road, Montclair, N. J., will receive bids until April 29 for manual training shop supplies for public schools for year 1931-32.

Passaic Steel & Iron Works, Inc., Passaic, N. J., care of Elmer Friedbauer, 86 Lexington Avenue, attorney, has been organized by Louis Reiss and I. George Kroll, with capital of \$75,000, and plans operation of local general iron and steel works.

Engraving & Engine Turning Co., 149 Mulberry Street, Newark, has leased space in building at 54 Mechanic Street for establishment of new plant. Present works will be removed early in May. O. A. vonBuckow is manager.

Unique Art Mfg. Co., 196 Waverly Avenue, Newark, manufacturer of mechanical toys, parts, etc., has plans for a two-story addition to cost close to \$100,000 with equipment. Saul Shaw & Co., 21 Commerce Street, are architects and engineers.

Charles W. Van Blarcom, 131 Church Street, Boonton, N. J., and associates have organized Hydroaulic, Inc., with capital of \$100,000, to operate a local plant for manufacture of door lifters and kindred hardware products. Willis W. Alexander, Boonton, is interested in new company.

Philadelphia

CONTRACT has been let by Philadelphia Electrical & Mfg. Co., 1236 North Thirty-first Street, Philadelphia, to Franklin M. Harris & Co., 1520 Parrish Street, for a one-story addition.

Keystone Pipe Line Co., a subsidiary of Atlantic Refining Co., 260 South Broad Street, Philadelphia, is planning construction of pipe line from oil refinery of parent organization at Point Breeze, near Philadelphia, to Scranton, Pa., thence to point on Pennsylvania-New York State line, to cost over \$500,000 with booster stations and other equipment. Later company plans second pipe line to Franklin and Pittsburgh. J. W. Van Dyke, chairman of board of Atlantic company, is president of Keystone organization.

Zinman Sprinkler Corp., Philadelphia, has been organized by Frank Zinman, 2129 North Ninth Street, and associates, to manufacture fire protection equipment, sprinkler systems, etc. Company will take over and expand business of similar character heretofore operated by Herman D. Zinman at Second and Green Streets.

Department of Wharves, Docks and Ferries, Municipal Pier, Philadelphia, is planning appropriation of \$1,000,000 for extensions and improvements in port properties, of which more than \$300,000 will be used for repairs and betterments in dredging plant, including equipment.

Auto Truck Parts Co., 1541 West Cabot Street, Philadelphia, has leased one-story building at 2514 West Hagert Street, and will occupy as a branch.

Walter B. Gilbert & Co., Inc., York, Pa., has been organized with capital of \$20,000 to take over and operate company of same name, with local plant for manufacture of metal cornices, ceilings, ventilators, etc. Walter B. Gilbert is president, and George W. Brose, treasurer. New company plans expansion for production of air-conditioning apparatus, and kindred specialties.

A. B. Farquhar Co., Ltd., North Duke Street, York, Pa., manufacturer of agricultural equipment, conveying machinery, etc., has purchased plant and business of Portable Machinery Co., Clifton, N. J., manufacturer of wagon loaders, parts and other conveying apparatus. Acquired company will continue under present name as a subsidiary of Farquhar company. Expansion in output will be arranged. W. W. Wentz, formerly vice-president and general manager of Portable company, will continue in charge of Clifton.

Reading Co., Reading Terminal, Philadelphia, is considering enlargement of yards and building at Rutherford, Pa., to cost over \$500,000 with equipment.

Ballinger Co., Twelfth and Chestnut Streets, Philadelphia, architect and engineer, has plans for a 15-story printing



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and allied crafts building, 136 x 176 ft., to cost about \$300,000 with mechanical equipment.

Speedy Signs, 34 North Fourth Street, Philadelphia, manufacturer of signs, displays, etc., has leased floor in building at 11 North Fourth Street, for new works and will remove to new location and increase capacity.

American Safety Lamp & Mine Supply Corp., Scranton, Pa., recently organized by P. Albert de Bussy, Scranton, and associates, plans operation of local factory for manufacture of safety lamps and equipment for coal mines. John V. Langan, Scranton, is one of the heads of new company.

Montoursville School Board, Montoursville, Pa., contemplates installation of manual training equipment in new high school to cost over \$200,000, for which plans will be prepared by Linthicum, & Linthicum, Washington, architects.

New England

BIDS are being asked by Bureau of Yards and Docks, Navy Department, Washington, until April 29, for a refrigerating and ice-making plant at naval hospital, Chelsea, Mass.

M. H. Rhodes, Inc., Hartford, Conn., recently organized, has established local plant for manufacture of an electric-controlled time switch, formerly produced at plant of Colt's Patent Fire Arms Mfg. Co., Hartford, on contract. Company has also arranged for plant at New Haven, Conn.

Riverside Boiler Works, Inc., 50 Harvard Street, Cambridge, Mass., has awarded general contract to F. LeRoy Fox, Inc., 101 Milk Street, Boston, for addition, 75 x 100 ft., including alterations in present plant, to cost over \$50,000 with equipment.

Officials of American Hardware Corp., New Britain, Conn., manufacturer of builders' hardware, etc., have organized American Hardware Corp. of Canada, Ltd., a subsidiary, which will take over plant and business of Springer Lock Co., Belleville, Ont. New company will manufacture locks and builders' hardware products as produced by parent organization.

Segal Lock & Hardware Co., South Norwalk, Conn., has work under way on expansion program for production of safety razors and blades, and will increase present output from 100,000 blades and 2500 razors daily to 200,000 blades and 5000 razors a day.

Ernest Taylor, 42 Antonio Avenue, Meriden, Conn., and associates have organized Federal Cutlery Co., Inc., with capital of \$50,000, to operate plant for manufacture of knives, cutlery, etc. Bernard Ellerstein, 1375 Ocean Avenue, Brooklyn, N. Y., is interested in new company.

G. E. Haynes, 29 George Street, Pittsfield, Mass., architect, has plans for three-story automobile service, repair and garage building, 100 x 130 ft., to cost over \$125,000 with equipment.

Automatic pumping machinery, blower exhaust fans, and other mechanical and electrical equipment will be installed in new laboratory to be erected by Bethwood Research Laboratories, Inc., Bethany, Conn., to cost about \$35,000. Frank Elwood Brown, New Haven, Conn., is architect.

Town School Board, Willimantic, Conn., contemplates installation of manual training equipment in two-story and basement high school addition, to cost about \$200,000, for which bids are being asked on general contract until April 27. Wilson Potter, 22 East Seventeenth Street, New York, is architect.

Riley Stoker Corp., Worcester, Mass., has bought control of Badenhausem Corp., Cromwell Heights, Pa., manufacturer of boilers and other steam-generating equipment. This purchase gives Riley corporation a complete line of equipment for fuel burning and generation of steam. Badenhausem plant will continue to operate as formerly, but F. Harold Daniels, president and two other officers of Riley corporation will constitute majority of board of directors. Riley fuel-burning equipment will be manufactured as previously in plants at Worcester and Detroit, and company also will continue its works at Decatur, Ill., and Toronto, Ont.

Fire the past week did considerable damage to punch press department and equipment of General Electric Co.'s plant at Lynn, Mass.

Keeney Mfg. Co., Newington, Conn., has started work on a one-story and basement plant, 40 x 120 ft.

Providence Granite Co., 210 Kinsley Ave., Providence, R. I., will shortly start work on a one-story granite cutting plant addition, 33 x 99 ft., for which miscellaneous equipment will be purchased.

Pine Tree Die Co., Auburn, Me., has absorbed Warren S. Longmore Die Co., Stoneham, Mass., and will move business to Auburn. New die cutting equipment is under consideration.

City of Holyoke, Mass., closed bids April 21 on a vocational school, to cost \$250,000 with equipment. It will contain nine shops of various kinds.

Bibeau Coal & Oil Co., Inc., 61 Commercial Street, Holyoke, Mass., will build coal pockets and install conveying equipment to cost \$15,000.

South Atlantic

IN connection with appropriation of \$4,562,000 for extensions and improvements in plants and system, Virginia Public Service Co., Charlottesville, Va., will expend considerable part of fund for work at new steam-operated electric generating plant, now under way at Bremon Bluff. Line extensions will also be made. Company will install additional steam power equipment at power plant at Hampton, Va.

Board of District Commissioners, Dis-



trict Building, Washington, will receive bids until May 1 for two brake testing machines; until May 7 for laboratory equipment.

Department of Public Buildings and Grounds, Navy Building, Washington, contemplates call for bids in May for steam power plant for central heating service, 91 x 180 ft., to cost about \$700,000 with equipment. D. H. Gillette is chief engineer of department.

Board of Public Improvement, City Hall, Baltimore, plans installation of manual training equipment in three-story high school, to cost \$160,000, for which bids are being asked on general contract until April 29. Smith & May, Baltimore Trust Building, are architects; Henry Adams, Calvert Building, is mechanical engineer.

Atlanta Gas Light Co., Atlanta, Ga., operating artificial gas properties, is disposing of a note issue of \$4,000,000, part of fund to be used for extensions and improvements.

Quartermaster Depot, United States Army, Washington, is asking bids until April 28 for 32 heating boilers for Langley Field, Va.

State Highway Department, Columbia, S. C., B. M. Sawyer, chief commissioner, has approved plans for one-story repair and maintenance shops for highway machinery and equipment at Darlington, Florence, Edgefield and Seneca. Engineering department is in charge.

Bureau of Yards and Docks, Navy Department, Washington, will take bids at once (no closing date stated) for a 250-ton stationary, hammerhead crane, electrically operated; a 20-ton traveling tower crane, with gasoline-electric power, and 10-ton traveling gantry crane with traveling revolving jib, gasoline-electric power, for Puget Sound navy yard, Bremerton, Wash.; until April 29 for extension of stock yard crane runway at navy yard, Washington, and floating deck on gasoline tank at navy yard, Charleston, S. C.

St. Louis

CONTRACT has been let by Laessig Oil Products, Inc., 314 North Broadway, St. Louis, to J. S. Alberici, Boatman's Bank Building, for one-story bulk oil storage and distributing plant, 45 x 150 ft., to cost about \$50,000 with equipment. George R. Bartling, Inc., Paul Brown Building, is architect.

Norris Grain Co., Board of Trade Building, Kansas City, Mo., has plans for an addition to grain elevator in Northeast industrial district, with capacity of 1,250,000 bu., including elevating, conveying, screening and other equipment, to cost about \$275,000.

Officials of General Metal Refining Co., 3100 North Broadway, St. Louis, are organizing a new company, with assets totaling about \$4,000,000, to take over present organization and consolidate with Lewin Metals Corp., Monsanto, Ill. G. Mathes Co., 3100 North Broadway, St. Louis, scrap metals, will be included in merger.

Plant of North American Car Co., Coffeyville, Kan., was recently destroyed by fire, with loss of about \$200,000.

Standard Pipe Line Co., operated by Standard Oil Co. of Indiana, 910 South Michigan Avenue, Chicago, is considering new pipe line from Alluwe, Okla., to oil-

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vertising pages of this paper regularly each week you can depend upon it that you will be acquainted with nearly everybody who is anybody in the business of supplying equipment

and materials that will help you in your fight against red ink.

But be sure to read the advertising pages every week. Once in a while is not enough, for not every company advertises in every issue. Some come before you only every other week, and still others only once a month. So, to get the benefit of the ideas they have for you, go over every page every week. It's time well spent: It will keep you in touch with developments which, in these days of narrow profit margins, may spell the difference between success and failure for you.

Remember: you can keep in touch with practically all the blue ribboners by reading the advertising pages of The Iron Age regularly.

A Taste of the Interesting Information in the Advertising Pages of This Issue

Die Castings with a strength of 85,000 lb. per sq. in.

A multiple spindle drill with 462 spindles—924 ball bearings!

An accumulator weighing over a million pounds, with pick-up weights for two different pressures.

A cutting off machine that uses an abrasive wheel.

A transcribing instrument, attached to knee-type milling machine for intricate profiling and die-sinking jobs. Automatic signal lights indicate when desired limit has been reached.

A wealth of valuable information awaits you in the advertising pages.

field district, about 25 miles, to cost over \$100,000 with equipment.

Board of Education, Kansas City, Mo., is considering installation of manual training equipment in new three-story and basement high school addition, to cost about \$400,000, for which bids will soon be asked on general contract. C. A. Smith, Finance Building, is architect.

Wabash Elevator Co., an interest of Wabash Railway Co., Railway Exchange Building, St. Louis, will soon begin erection of addition to grain elevator at North Kansas City, Mo., including elevating, conveying, screening and other equipment, to cost \$300,000. Unit will be operated under lease by Uhlmann Grain Co., Board of Trade Building, Kansas City, Mo.

Western Service Corp., Braniff Building, Oklahoma City, Okla., operating gas properties, is considering immediate call for bids for installation of a distributing system at Guthrie, Okla., to cost close to \$275,000. Fred E. Salathiel, address noted, is company engineer.

W. E. Womble & Sons, 1500 May Street, Fort Smith, Ark., contemplate new one-story plant for manufacture of steel fence posts and kindred specialties, including division for production of reinforced concrete posts.

Arkadelphia Special School District No. 1, Arkadelphia, Ark., plans installation of manual training equipment in new two-story and basement high school to cost about \$140,000, for which bids will be asked on general contract in 30 to 60 days. Petter & McIninch, Pyramid Life Building, Little Rock, Ark., are architects.

Detroit

ARRANGEMENTS are being made by Advance Casting & Mfg. Co., Owosso, Mich., care of Industrial Committee, Owosso Chamber of Commerce, for establishment of plant for manufacture of iron castings and kindred products. Company was formerly located at St. Louis, where plant was recently destroyed by fire. John Spousta is head.

Weaver Brothers Co., Adrian, Mich., manufacturer of steel pickling equipment and supplies, has arranged for a consolidation with H. J. Bowie Co., 9205 Inman Avenue, Cleveland, operating a steel fabricating works. It is proposed to remove Adrian plant to Bowie works, where department will be arranged for manufacture of equipment and devices used in pickling.

Wolverine Saw & Knife Co., 6501 Mack Avenue, Detroit, recently organized, plans operation of local factory for manufacture of saws, knives and kindred products for wood-working mills. Company is headed by E. G. Scott and A. F. Skibbe, 2968 Philip Avenue.

Department of Water, 735 Randolph Street, Detroit, has filed plans for new units at Springwells water station, including machine shop, steam power house, equipment storage and distributing plant, automobile service and garage unit, to cost over \$900,000 with equipment. Engineering department is in charge.

Universal Insulation Co., Detroit, recently organized by James A. Nagy, Detroit, and associates, has taken over part of former plant of Studebaker Co., Brush Street and Piquette Avenue, for production of new insulation products used in iceless refrigerators, refrigerator cars, etc.

Construction Materials Corp., 33 North



La Salle Street, Chicago, operating sand, gravel, stone and other properties, has arranged a note issue totaling \$1,500,000, part of fund to be used for expansion and improvements at works at Ferrysburg, Mich., and other points.

Board of Education, Manistique, Mich., is considering installation of manual training equipment in new three-story high school to cost over \$250,000, for which bids are being asked on general contract until April 28. R. V. Gay, St. Johns, Mich., is architect.

Frank Riess, Kokomo, Ind., and C. W. Kirsch, Sturgis, Mich., have organized Riess Efficiency Tool Co., Sturgis, with capital of \$100,000, and plan operation of factory at Sturgis for manufacture of tools and mechanical specialties. C. E. Sullivan, Sturgis, is interested in new company.

Buffalo

PROPERTY at 1244 Dufferin Street, Toronto, Ont., totaling 11,000 sq. ft., floor space, has been leased by Fedders Mfg. Co., 57 Tonawanda Street, Buffalo, manufacturer of automobile radiators, electric refrigeration equipment, etc., for branch plant. A subsidiary under name of Fedders Mfg. Co., Ltd., has been formed to carry out development of Canadian works. Company is also increasing facilities for production of electric refrigeration parts at Buffalo works, with extension in division formerly used for radiator production.

Sodus Canning Co., Sodus, N. Y., has plans under way for new plant to replace factory recently destroyed by fire, to cost about \$100,000 with cannig machinery, conveying and other equipment. Frank D. Gaylord is general manager.

Golf Drive Machine Co., Inc., Syracuse, N. Y., recently formed with capital of \$50,000 by Willis C. Jones, 141 Bassett Street, and associates, plans operation of local plant for manufacture of slot machines for practice of driving golf balls. Lloyd S. Pierce, 148 Genesee Street, Auburn, N. Y., is interested in new company.

Elmira Foundry Co., Elmira, N. Y., has awarded general contract to Lowman Construction Co., Inc., Elmira, for one-story addition, 50 x 160 ft., to cost close to \$50,000 with equipment. Company is a subsidiary of General Electric Co., Schenectady.

Niagara Gas Corp., Aurora, N. Y., recently formed to operate natural gas properties in State, will take over Alden-Aurora Gas Co.; Aurora, and Shore Gas Co., which controls Erie County Gas Co. Acquiring company is arranging for stock issue of 100,000 shares, no par value, for acquisition of properties noted, extensions and improvements.

Cleveland

BIDES are being asked by Board of Education, Southard and Linwood Avenue, Toledo, Ohio, until April 30 for steel lockers, steel shelving, tables and other school equipment. R. W. Wenzlau is director.

J. C. Virden Co., 6103 Longfellow Avenue, Cleveland, manufacturer of electrical products, has awarded general contract to G. A. Rutherford Co., 2725 Prospect Avenue, for two-story and basement addition, 35 x 150 ft., to cost about \$45,000 with equipment.

Machined Steel Casting Co., Alliance, Ohio, has approved plans for expansion and improvements, including two one-story units for core room and other service, electrification of part of plant, installation of new molding machines and auxiliary equipment, to cost over \$50,000. W. E. Trump is general manager.

Electric Cable Joint Co., Cleveland, care of Thompson, Hine & Flory, Guardian Building, attorneys, recently formed, plans operation of local factory for manufacture of electrical and mechanical specialties. F. E. Murphy and B. R. Harman are principal incorporators.

Transue & Williams Steel Forging Corp., Ely Street, Alliance, Ohio, is arranging production for a new line of specialties, including fittings, couplings, etc., for natural gas, oil and water pipe lines, for which tonnage contract has been secured from Vitaule Co., and will increase operations as soon as dies and other equipment are provided.

Ohio Oil Co., Findlay, Ohio, affiliated with Standard Oil Co., Cleveland, has plans for natural gas pipe line from oil properties in Dry Creek oilfield, Mont., to Bozeman, Mont., about 125 miles, to cost over \$2,000,000 with compressor stations and other equipment. Company engineering department will be in charge and will establish offices at Bozeman.

Cleveland Formgrader Co., Cleveland, care of T. W. Dieckmann, 1522 West Clifton Boulevard, recently organized by Mr. Dieckmann and associates, is considering operation of local plant for manufacture of road-grading and kindred machinery. Jasper G. Tullis, Cleveland, is interested in new company.

White Sewing Machine Corp., Cleveland, has closed contract with Electrolux, Inc., 250 Park Avenue, New York, for manufacture of Electrolux vacuum cleaners which are now being made in Stockholm, Sweden, and shipped to this country. Closing of this contract represents part of a program inaugurated by White company some time ago for diversification of its manufacturing operations and better utilization of its facilities. Company is also producing radio cabinets and doing a large amount of special contract manufacture.

Chicago

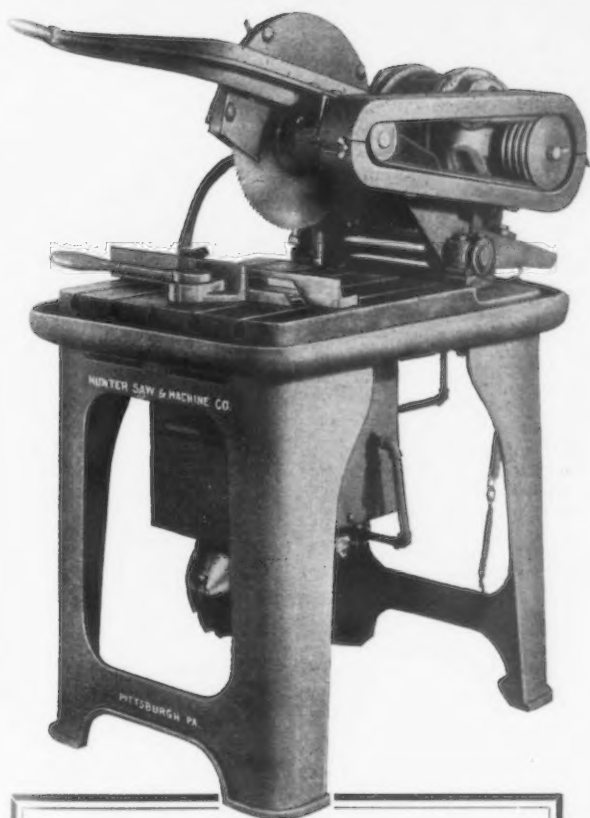
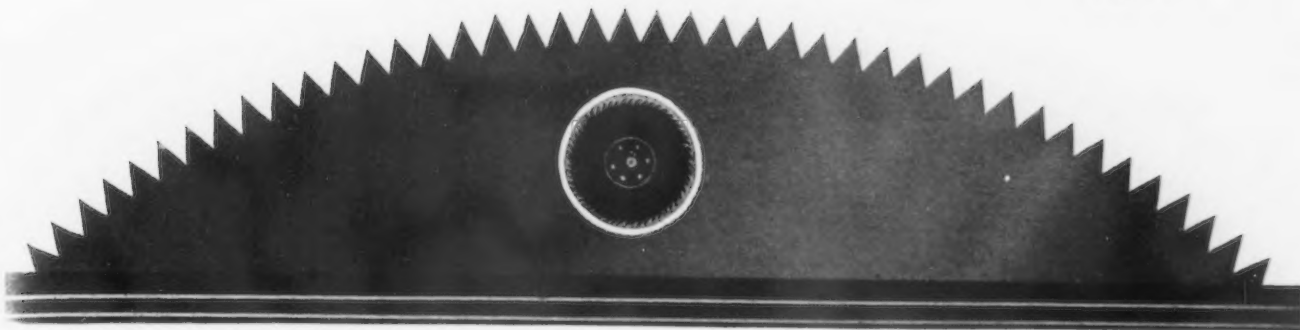
BIDES are being asked until May 1 by Quartermaster, Army Department, Sixth Corps Area, Chicago, for two automatic coal stokers for Fort Sheridan, Ill.

Central Can Co., Inc., 2035 Charleston Street, Chicago, manufacturer of tin cans, etc., has leased one-story building, 80 x 110 ft., at 4527-35 West Lake Street, for new plant for increased capacity.

Perry Coal Co., O'Fallon, Ill., is considering rebuilding tippie at local Ellen mine, recently destroyed by fire, with loss over \$75,000 including equipment.

Montana-Dakota Power Co., Minneapolis, Minn., has approved plans for an addition to steam-operated electric power plant at Kincaid, Mont., to cost about \$150,000 with equipment.

United Razor Blade Corp., 64 West Randolph Street, Chicago, recently organ-



HUNTER

Cutting-Off Saw

No. 6 for Steel Cutting

**No. 6-A for Brass and
Copper Cutting**

**No. 6-B for Aluminum
Cutting**

The standard No. 6 machine is equipped with a 5 H.P. motor and 18" diameter toothed saw for steel cutting. The motor and saw blades are mounted upon opposite ends of a well-balanced steel swing frame, and the saw is driven by positive V-belts. The saw arbor is mounted on tapered roller bearings which are kept in oil-tight, dust-proof housings. The saw blade and V-belts are protected by steel guards to conform to safety specifications.

The 6-A machine is designed for cutting brass and copper solids, shapes, and tubing. The design of this machine is the same as the No. 6 except that it is equipped with a 3 H.P. motor and a $\frac{1}{8}$ H.P. motor is used to drive the coolant pump which is mounted on a self-contained reservoir under the saw table.

The No. 6-B machine is designed for cutting aluminum solids, shapes, and tubing. It is identical to the No. 6-A machine with the exception that the peripheral speed of the saw is faster.

These three models cover a wide range of high speed cutting-off work. Consult Hunter for modern high speed cut-off Saws.

We also manufacture:

Inserted Tooth Saws—Circular Milling
Saws—Pneumatic Hammer Rivet Sets—
Chisel Blanks—Hardened Steel Specialties

HUNTER SAW AND MACHINE CO.

5660 BUTLER STREET,  PITTSBURGH, PENNA.



ized with capital of \$100,000 by Harry Z. and Bernard Perel, contemplates local plant for manufacture of razor blades and kindred products. Sydney R. Drebin is interested in new company.

Minnesota Valley Canning Co., Le Sueur, Minn., operating vegetable and fruit canning plant, will soon begin work on two-story and basement addition, 40 x 110 ft., to cost about \$70,000 with equipment. H. C. Gerlach & Co., Mankato, Minn., are architects. Company is planning branch plant at Windsor, Ont., to cost over \$60,000 with canning, conveying and other equipment. E. B. Cosgrove is president.

Consumers Co., Lemont, Ill., is planning to rebuild part of stone-crushing plant, including machine shop, blacksmith shop and other units recently destroyed by fire, with loss more than \$175,000 including equipment.

Common Council, Redwood Falls, Minn., will receive bids until May 5 for pumping machinery and water softening equipment for municipal waterworks. Wolff & Coates, Globe Building, St. Paul, Minn., are consulting engineers.

Radio Steel Co., 4714 West Kinzie Street, Chicago, has changed its name to Radio Steel & Mfg. Co., and has increased capital from \$20,000 to \$100,000 for expansion.

Milwaukee

BOARD of Water Commissioners, Racine, Wis., closes bids May 15 for waterworks improvements costing \$646,000, including erection of additional pumping station, extension to filtration plant, and a service building to house meter shop, machine shop, garage and construction department. Alvord, Burdick & Howson, 29 West Wacker Drive, Chicago, are consulting engineers. Walter Peirce is secretary of board.

American Telephone & Telegraph Co., 311 West Washington Street, Chicago, has plans for erection of \$100,000 repeater station, 50 x 80 ft., one and one-half stories, at Baldwin, Wis. Work will start about June 1.

James Mfg. Co., Fort Atkinson, Wis., manufacturer of steel barn and dairy equipment, has increased its capital stock from \$800,000 to \$1,250,000. No important plant enlargement is contemplated at this time, however.

Common Council, Monroe, Wis., has placed contract with Burrell Engineering & Construction Co., 1 North Canal Street, Chicago, for complete construction of sewage disposal plant at \$55,450.

Board of Vocational Education, Superior, Wis., has accepted bid of Jensen & Campbell, 5401 Oakes Avenue, local, for new shop building, 100 x 200 ft., one story, at \$38,160. With equipment plant will cost about \$75,000.

General Box Co., 508 North Dearborn Street, Chicago, will rebuild its plant at Sheboygan, Wis., wrecked by fire some time ago. Investment in buildings and equipment will be about \$200,000. M. C. Hillyer is vice-president in charge.

Pittsburgh

CONTRACT has been let by D. J. Rex Box Co., Boyd and Locust Streets, Pittsburgh, manufacturer of folding paper boxes and containers, to W. J. Payne, 87

Betzhoover Avenue, for rebuilding part of factory recently destroyed by fire, to cost about \$50,000 with equipment.

Gulf Refining Co., Frick Annex, Pittsburgh, has applied for permission to dredge a harbor in Ohio River at Newport, Ky., for construction of a steel floating dock for oil storage and distribution. Company has plans for extensions in storage and distributing plant at Cleveland, including new buildings and equipment to cost about \$180,000.

Board of Education, Erie, Pa., has plans for a one-story technical high school, 40 x 270 ft., to include metal-working, automobile repairs and other mechanical departments, to cost over \$125,000. Myers & Johnson, Commerce Building, are architects.

Morgan Brothers Co., Pittsburgh, has been organized with capital of \$150,000 to take over and expand company heretofore operating as Morgan Brothers, with sheet metal works at 7227 Tioga Street. New company is headed by J. Scott Morgan, Ira D. Morgan and Frederick E. Geier.

H. Ginsburg, Plaza Building, Pittsburgh, architect and engineer, has plans for three-story automobile service, repair and garage building, 125 x 130 ft., to cost over \$100,000 with equipment.

Philadelphia Co., 435 Sixth Avenue, Pittsburgh, operating Duquesne Light Co., and other electric and gas utilities, has purchased Duff City Gas Co., operating in different parts of Allegheny County, and will consolidate, carrying out expansion, including pipe lines, etc.

Niagara Paper Mills, Lockport, N. Y., manufacturer of roofing papers and other heavy stocks, has arranged for purchase of paper mill of Barrett Co., Latrobe, Pa., and will operate as branch mill. Purchasing company plans expansion, including electrification of part of mill and installation of additional machinery, to cost about \$80,000.

Gulf States

PLANS are being completed by Sinclair Consolidated Oil Co., 45 Nassau Street, New York, for pipe line from oil fields in eastern Texas to point near Mexia, Tex., about 100 miles, where connection will be made with system of Prairie Pipe Line Co., an interest of Prairie Oil & Gas Co., Independence, Kan., with which Sinclair company has made cooperative agreement for oil transmission to different points. Sinclair line will be built by Sinclair-Texas Pipe Lines Co., a subsidiary, and will cost over \$1,000,000 with pumping stations and other equipment.

May Trailer Co., Morgan City, La., manufacturer of motor truck trailers, parts, etc., is considering one-story plant, totaling about 10,000 sq. ft. floor space, to cost about \$26,000 with equipment.

Edward F. Mann, 502 Cotton Exchange Building, Fort Worth, Tex., is at head of a project to build a dry ice-manufacturing plant, to cost \$50,000 with equipment. A company will be organized to carry out enterprise.

Stanolind Crude Oil Purchasing Co., Kilgore, Tex., is planning new oil loading rack with capacity of 50 cars, on local

site, in conjunction with a new pipe line to be built from its Laird lease in Kilgore district to loading plant, entire project to cost over \$60,000 with equipment.

Ulen & Co., 120 Broadway, New York, and affiliated organization, Ulen Engineering Corp., same address, will soon begin superstructure for hydroelectric power plant near Maverick, Tex., using water from Rio Grande River, to cost about \$1,500,000 with equipment. Company has completed construction of power line and substation at power site and has work under way on power canal for water supply. Entire development will cost close to \$6,000,000. Output of plant will be used in part by Central Power & Light Co., San Antonio, Tex., and power interests of Electric Bond & Share Co., 2 Rector Street, New York, in vicinity of development.

San Marcos Independent School District, San Marcos, Tex., is considering installation of manual training equipment in new high school to cost about \$200,000, for which it is expected to ask bids on general contract in May. Harvey P. Smith, National Bank of Commerce Building, San Antonio, Tex., is architect.

Simms Oil Co., Dallas, Tex., is planning construction of pipe line from its oil wells in Tenery tract, Gregg County, east Texas, to oil refinery near Dallas, about 130 miles, to cost about \$1,000,000 with pumping stations and other equipment. Company is also considering expansion in oil refinery.

McMillan Refining Co., Borger, Tex., has plans for a new oil topping plant about four miles from Longview, Tex., to cost over \$75,000 with machinery. Company is also planning erection of new loading rack in same vicinity, to cost upward of \$25,000 with pipe line and distributing facilities.

City Council, Starkville, Miss., is planning erection of a municipal electric light and power plant, to cost over \$50,000 with equipment. Swanson & McGraw, Balter Building, New Orleans, La., are consulting engineers.

City Council, Wellington, Tex., is planning a municipal artificial gas plant and system to cost about \$80,000. A special election will be held to vote bonds in amount noted.

Cincinnati

PLANS have been filed by Ohio Steel Foundry Co., Springfield, Ohio, for one-story addition.

United States Engineer Office, Cincinnati, is asking bids (no closing date stated) for constructing and delivering one steel maneuver boat hull with derrick.

MacDonald Steamotor Co., Knoxville, Tenn., recently organized by T. J. MacDonald, P. O. Box 1335, and associates, is planning establishment of local plant for manufacture of a steam washing machine unit, including parts and assembling, and other steam-operated equipment. Mr. MacDonald is president; S. M. Henderson secretary and treasurer.

City Water Co., Chattanooga, Tenn., has arranged for a bond issue of \$2,250,000, part of proceeds to be used for expansion and improvement in plant and system.

United States Engineer Office, P. O. Box 1017, Memphis, Tenn., will receive bids until April 27 for one 6-drum gasoline engine-driven hauling winch.



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sheet metal working problems**

YOU may possibly consider that your sheet metal operations are now being performed with the greatest possible speed and economy. Even if you are satisfied with present performance, however, it will pay you to check up with Bliss.

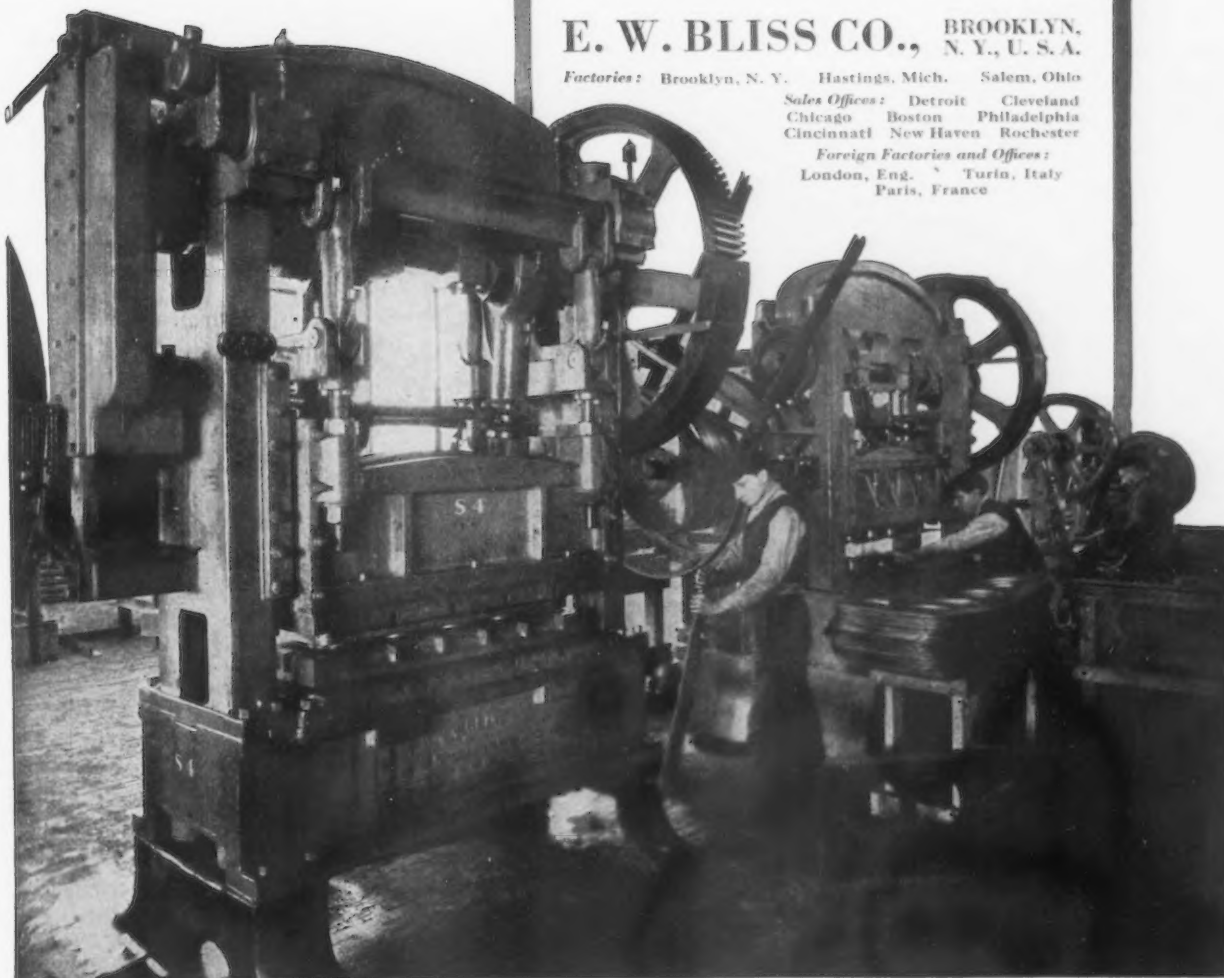
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No. 506

▲ ▲ Business as Others See It ▲ ▲

Digest of Current Financial and Economic Opinion

DEMANDS for reductions in wage rates and inclinations to look to the expected business bulge in the autumn for the first real relief from the depression feature this week's reviews. The former is becoming more insistent, and numerous cases are reported of so-called "bootlegging" of wages.

A moderate level of activity "until the normal stimulus of autumn makes itself felt in the late summer" is predicted by *Annalist*. No substantial improvement before the end of summer can be seen by Benjamin Baker: "So long as declines of $\frac{1}{2}$ to 1 per cent a week in the price index continue, conditions cannot be considered sufficiently stable to make practicable a decisive upturn in production and trade activity."

Buying Power Hard Hit

Several observers note a decline in purchasing power with declines in wages and salaries, dividend payments and business profits. "Revived agitation on wage cuts and further weakness in commodity prices are two influences of highly important character [which] have probably acted to cause renewed hesitation," is the verdict of the *New York Times*.

That publication lauds a species of "creative buying" initiated by the Woolworth organization. Woolworth and certain manufacturers, working together, bring hitherto unattainable items within the 10-cent retail range. This, thinks the

Times, "might provide the very scheme which is needed by so many other retailers who are sick of price competition and yet realize that price is a highly important factor in the present struggle for trade."

Moderate optimism features the survey of the Harvard Economic Society. Business gains in the first quarter were, it appears, accompanied by no inventory swelling in manufactured goods. "Further gains in business volumes . . . are likely to be accompanied presently by improvement in commodity prices."

Industry and Building in the Van

Harvard finds that construction and manufacture and some other important activities gained more than seasonally in the first quarter. But business in the aggregate gained less than customary. "That gains have started from a far lower level [compared with a year earlier] gives reason for thinking that they will prove more lasting."

That March showed up better, in comparison with a year ago, than February did causes Poor's certain encouragement. Seven leading items are cited in which this was observed: freight car loadings, electric power production, steel ingot production, pig iron production, construction contracts, automobile production and bituminous coal mining.

A cheerful note is struck by *Commerce and Finance*, also: "Op-

timism is in the ascendant, and distributors report a fairly active demand for most staple goods. They say that the demand for luxuries is poor. . . . An expectation of better business is becoming more general."

Money rates are showing a tendency to greater firmness and, "when trade begins to expand again, it is not to be expected that the demand can be supplied at present cheap rates."

Worried About Summer Dullness

Improvement has not been halted, Alexander Hamilton Institute thinks. "Yet the necessity of combating the depressing influences of summer without the support of a more vigorous recovery than that which has so far occurred . . . precludes the probability of a satisfactory volume of business before fall."

This summer slump bothers many writers. "Business is passing into its season of normal decline in a state of nervous apprehension," says Paul W. Garrett, financial editor, *New York Evening Post*.

Roger W. Babson sees the clouds breaking. "I should not be surprised," he says, "to see a shortage of labor in some lines before the year is over. . . . I think we are going to see continued decline in commodity price averages, but a good many things . . . are below cost of production and are striking bottom."

Board of Education, Glasgow, Ky., contemplates installation of manual training equipment in new two-story and basement high school to cost about \$100,000, for which bids will be received on general contract until April 28. Harry E. Boyle & Co., Furniture Building, Evansville, Ind., are architects.

Ducktown Copper Co., Ducktown, Tenn., has work under way on expansion and improvements to cost over \$500,000 with machinery.

Indiana

BIDS will be asked at once by Board of Trustees, Purdue University, Lafayette, for addition to power plant, to cost about \$100,000 with equipment. Walter Scholer, Wallace Building, is architect.

Cinetropes Co., 1519 Merchants' Bank Building, Indianapolis, recently organized by Burton F. Swain, Seymour, and associates with capital of \$40,000, is planning operation of local factory for pro-

duction of projector equipment for sound pictures in homes. Company has placed order with Indiana Furniture Co., Shelbyville, for projector cabinets for initial machines. National Sound Films, Inc., same address, lately organized, will be affiliated with Cinetropes Co., and will reproduce sound films for use in projectors manufactured by last-noted company. Julius Frankenberg is head of National organization.

Terre Haute Malleable & Mfg. Co., Terre Haute, has plans for one-story addition to foundry, to cost about \$35,000 including equipment.

Pacific Coast

PLANs have been approved by Union Ice Co., 354 Pine Street, San Francisco, for new one-story artificial ice-manufacturing plant at Watsonville, Cal., 75 x 100 ft., to cost about \$100,000 with machinery. Plans are also under way for a similar plant at Redwood City, Cal., 100 x 125 ft., to cost close to \$125,000

with equipment. Company engineering department is in charge.

Pacific Gas & Electric Co., 245 Market Street, San Francisco, is planning construction of pipe line for natural gas in Seaside district, Salinas, Cal. T. W. Snell is division manager at Salinas.

Barde Steel Co., 2715 Utah Street, Seattle, is considering new branch storage and distributing plant at Spokane, Wash., 100 x 200 ft., with overhead cranes and other handling equipment, to cost more than \$100,000.

Board of Education, Pasadena, Cal., has authorized plans for a vocational shop building at junior college, to cost about \$40,000 with equipment. Frederick Kennedy, Jr., 15 South El Molino Street, is architect.

City Council, Yakima, Wash., has authorized municipal equipment plant, 80 x 100 ft., with meter shop, assembling department, automobile service and repair department, and storage and distributing section, to cost about \$35,000 with one-story L-extension, 20 x 113 ft., for motor trucks. C. E. Crownover is city engineer.

